THE

Practical Teacher

A MONTHLY EDUCATIONAL JOURNAL.

Edited by JOSEPH HUGHES.

'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

VOL. VIII. NO. II. JANUARY, 1889. PRICE, 6D. POST FREE, 7½D.

How my School was Examined.

BY THE

HEAD MASTER OF AN ENGLISH SCHOOL.

STANDARD I.

Arithmetic.—1. 202 + 87 + 684 + 61 + 967.
2. 604 − 19.
3. 915 − 186.
Answers.—(1) 2,001; (2) 585; (3) 729.

Writing and *Spelling.*—*World, Nose, Ounce, Cottage, Finger, Hand, Master, Board, Coat, Fall.*

Geography.—Children were asked the meaning of the letters N., S., E., W., marked on plan of school; to point out East side and South side of school; to name the direction of a course taken between these points; to form a word of the letters N., S., E., W. In coming to school this morning where did you observe the sun? In what direction do you never see the sun? Do any people see the sun in the north? Some people may have never seen a map: what would you tell them it was? What is there to be seen on the map? Point to a map in school, give its name (several other names of maps). The course of the Danube taken to point out the beginning. What do these shaded lines represent? (*Mountains.*) How is a river represented on a map? Why is it drawn now out, then in, first up, then down? Will a river run up? What is meant by showing it running up on the map? Which is the largest map in the school? (*England* or *Eastern Hemisphere.*) Why are they made both about same size?

STANDARD II.

Arithmetic.—1. 201,001 + 9,804 + 68 + 14,071 + 497.
2. Divide 75,040 by 11.
3. Take 36,028 from 89,080.
4. Multiply 7,807 by 860.
Answers.—(1) 225,441; (2) 6,821 + 9; (3) 53,052; (4) 6,714,020.

Writing and *Spelling.*—'When pressed with hunger the white bear becomes very fierce, and will then attack any man or beast he meets with. A story is told of some sailors in these regions having once been attacked by three hungry white bears.'

Grammar.—Nouns and Verbs were picked out from Dictation exercise; and questions asked such as follow. Why is 'hunger' a noun? What kind of bear would he be called? (*Hungry.*) What part of speech is 'hungry'? The compound verb 'will attack' to be given as one verb, its parts 'will' and 'attack' taken. What name is given to such verbs as 'will'? What does the verb 'will attack' express the action of? Definition of a verb. 'Having been attacked' were taken as participles. Give an example of 'attacked' used as a verb.

Geography.—What geography has been learnt during the year? (*Size and shape of earth, &c.*) Tell the name of some object which would nearly represent the shape of the earth. (*Orange.*) In what particular parts does the orange correspond in shape with the earth? (*Top and bottom.*) What particular name is given to each of these parts of the earth? What size is the earth? Which is the greater distance, round about it or directly through it? What is the distance through? What particular name is given to the distance round the earth? also, name given to distance through the earth? How many times is the circumference greater than the diameter? By what simple way can we prove that the earth is round? Give the name of a famous Englishman who sailed round the world. Tell the names of any oceans he would cross. Which is the largest of these? What great body of land between the Atlantic and Pacific? Which of the continents are we nearest to? Why are they called continents? Give the names of some countries in Europe. Which county do you live in? Point to the part of England on the map. What particular name would you give to this level country district? What use is a river? What particular name is given to the land drained by a river? Point out a watershed on the map of England. Definition of a cape asked for, and the various other names by which such points may be known.

Mental Arithmetic.—How many halfpennies in 7½d.? Which is the larger, 11 times 12 or 12 times 12? What is 11 times 12? If a boy spends ½d. per

day, how much will he spend in a fortnight? If I got 2 eggs for 1½d., what would 4 eggs cost? How many threepences in a two-shilling piece? Half a pound of butter at 1s. 4d. per lb. What is the half of 11? How much is 38 pence, 60 pence, 60 halfpennies?

STANDARD III.

Arithmetic.—Boys.—1. Add together £371 10s. 6¾d. + £4,626 12s. 3½d. + £271 8s. 4¼d. + £34,231 11s. 2d. and 4½ guineas.

2. Subtract 19 times 190 from a quarter of a million.

3. Take £422 6s. 4½d. from £6,701 0s. 3½d.

4. In 15 houses there are 26 windows, with 12 panes in each window; other 9 houses have 15 windows, with 6 panes in each. How many panes are there in the 41 windows?

Girls.—1. Add together £76,809 14s. 5½d. + £806 0s. 6½d. + 6½d. + £567 15s. 3¾d. + 16s. 11¼d.

2. Divide half a million by 987.

3. A woman bought 10 pairs of boots at 10s. per pair, and sold them for 5½ guineas; how much did she gain by the transaction?

4. Bought 5 pennyworth of nuts at 12 a penny. 1 out of every 10 were bad. How many bad ones in the lot bought?

Answers.—Boys. (1) £39,505 16s. 10½d. (2) 246,390. (3) £6,278 13s. 10¾d. (4) 402.
Girls. (1) £78,184 7s. 9¼d. (2) 506 + 578. (3) 15s. 6d. (4) 6.

Writing and Spelling.—'Dreadful scenes were sometimes witnessed. Fathers followed the dead-carts which contained the remains of their families, and moaned with grief and pity when they saw how rudely they were thrown into the grave and put out of sight. Even more dreadful was the case of those who sought to drown their fears in drinking.'

Grammar.—Parts of Speech were taken from the Dictation Exercise.

What is the singular of 'scenes'? Give me another word meaning much the same as 'scenes.' (*Scenery.*) What kind of a noun would you call 'scenery'? Why? Name any other abstract nouns you notice in this piece. What is a pronoun? What noun is 'their' used instead of? What pronoun would you use for the singular? What case are these pronouns in? Make a sentence of your own containing the word 'witnessed.' Does it refer to the present time or past? What would we say if it referred to the present time? What other part of speech may the word 'witness' be? Give an example. What kind of an adjective is 'dreadful'? What degree of comparison? To express it in its highest form what would we say? Why do we say 'more dreadful' in the line 'Even more dreadful was the case of those who sought to drown their fears in drinking'? What is the use of 'more'? What kind of adverb? Name as many kinds of adverbs as you can. Give an example of a sentence containing an adverb of Time.

Geography.—How many counties are there in England? How many in Wales? Each child in turn name a Welsh county. What river separates Cardigan from Pembroke? Name a river in North Wales. What particular name is given to the whole of the Welsh Mountains? Meaning of the word Cambrian. Name some of the highest mountains. Meaning of Cader Idris. What are the chief occupations of the people of Glamorganshire? From what seaport in this county is coal sent? Passing by rail from Carnarvon to Anglesea, what piece of water is crossed? This is a branch of what railway? Which is the largest river in Wales? Name another Welsh river rising near the source of the *Severn*.

Mental Arithmetic.—How many sixpences in 7s. 6d.? In one pound of tea there are 16 ozs.; how many in quarter of a pound. Divide 5s. among 60 children; how much for each? 1½ doz. eggs at 2 for 2d. A boy saves 2s. 6d. per week; how much will he have saved in 8 weeks? Bought eggs at 4 for 6d.; how much is that each? I have 100 oranges; how many more should I want to give 40 children 3 each? In a month's holiday how many school days are missed? Bought ½ lb. of coffee at 1s. 8d. per lb., and ¼ lb. of butter at 1s. 4d.; how much change ought I to receive out of half a crown? How much is 16s. 4d. short of a sovereign? If I share one pound among six girls how much would they each receive?

STANDARD IV.

Arithmetic.—Boys.—1. Divide £10,124 by 311.

2. Bought 60 lbs. of butter at 1s. 5d. per pound. Half was sold at 1s. 6d. and the remainder at 1s. 8d. per pound. What was the profit?

3. Fifty men earn 2s. 6d. each; 50 women earn 1s. 3d., and 50 children 7½d. each per day; what were the total earnings per day and per week?

4. Reduce 8 acres to half inches.

Girls.—1. Reduce 132 yards, 1¼ feet, 7 inches, to inches.

2. Multiply £1,058 16s. 8½d. by 1,080.

3. Divide £8,604 8s. 9¾d. by 68.

4. ¾d. is gained on every 4 ozs. of tobacco sold. How much will be gained on 7½ lbs.?

Answers.—Boys: (1) £32 11s. 0½d. + 290; (2) 10s.; (3) £10 18s. 9d. per day, £65 12s. 6d. per week; (4) 100,362,240 half inches.

Girls: (1) 4,777 inches; (2) £1,143,542 5s.; (3) £126 10s. 8½d. + 31; (4) 1s. 10½d.

Grammar.—Parse, as fully as you can: 'From Flodden ridge the Scots beheld the English host.' Conjugate the verb 'beheld' in the Imperative and Potential Moods.

Mental Arithmetic.—How many quarters in 2½? Multiply 30½ by 8. 4½ times 20. 1¾ lbs. of beef at 8d. per lb. What is $\frac{1}{10}$th of a sovereign? What is $\frac{3}{10}$th? How many pint tins can I fill out of a gallon and a half of milk? Apples are sold 10 a penny; how many for a half-a-crown? How many half stones in a hundredweight? What part of £1 is 5s.? What is the half of a guinea?

STANDARD V.

Arithmetic.—1. Add together $\frac{1}{4} + \frac{7}{8} + \frac{1}{2} + \frac{1}{16}$, and subtract $\frac{9}{16}$ from the total.

2. If 34 hats can be bought for £48 9s. 6d., how many can be bought for £145 8s. 6d.?

3. Make out and receipt the following bill:—
54 sheets of artists' canvas at 6s. 4d. each.
2,000 sheets cartridge at 5s. 4d. per 100.
6 boxes of colours at 2s. 9½d. each.
49 framed etchings at £12 10s. each.
2 doz. camel hair brushes at 12s. a gross.

4. A chemical factory consumes 13 tons of coal in a week at the rate of 9s. 4d. per ton; what would be the cost of coal consumed in 1½ years?

Answers. (1) $1\frac{41}{120}$. (2) 102. (3) £17 2s. + £5 6s. 8d. + 16s. 7½d + £612 10s. + 2s. = £635 17s. 3½d. (4) £473 4s.

Grammar.—What is a sentence? Parse and Analyse fully: 'The Scots beheld the English host Leave Barmore Wood, their evening post.' What do you understand by analysis? What is the case of 'post' in the above sentence? What do you mean by apposition? Give an example of your own of a sentence containing a noun in apposition. Form adjectives from the following and give examples of sentences containing them—*horizon, society, people.*

Mental Arithmetic.—Add $\frac{1}{8}$ and $\frac{1}{6}$. What is a multiple? Tobacco at 4d. per oz., how much would be paid for a stone? Take $\frac{1}{4}$ from $\frac{3}{5}$. How many $\frac{1}{10}$ in 2? 15 pairs of ducks at 1s. each. A schoolroom window has 10 panes in length and 8 in breadth, how many panes in the square surface of window? What must be added to $\frac{1}{4}$ of a pound to make a sovereign?

STANDARD VI.

Arithmetic.—Boys.—1. If $\frac{7}{8}$ of a ton cost £22 15s. 0d. what would $\frac{2}{13}$ of a cwt. cost?

2. Divide ·00270 by 3·01.

3. If a man travels 312 yards in ½ min., how far would he travel in 31½ minutes?

4. A postage stamp is 1 inch in length, and 3 stamps side by side would measure 4 inches; how many square inches will 10s. worth of stamps cover?

Girls.—1. Bring 2·0625 to a vulgar fraction and multiply the answer by $\frac{8}{9}$.

2. Add together $\frac{1}{8}$ of 5s., $\frac{1}{10}$ of £1, $\frac{7}{12}$ of 7s. 6d., and $\frac{3}{5}$ of £1.

3. If ·6125 of a pint is filled 40 times from a cask containing 48 gals., how much of the liquid is there left?

4. Gold-leaf costs 4½d. per inch; what will 32 inches long by ¾ in. broad cost?

Answers.—Boys: (1) £1 4s. (2) ·000897+. (3) 19,656 yds. = 11 mls. 1 fur. 13 p. 4½ yds. (4) 1 sq. ft. 16 sq. in.

Girls: (1) $1\frac{3}{8}$. (2) 17s. 2½d. (3) 44 gals. 3 qts. 1 pt. 2 gills. (4) 9s.

Composition.—Write out all you can about the life of Her Majesty Queen Victoria.

Grammar.—What do you understand by a Complex Sentence? What name is given to the dependent parts of these sentences? Give an example of a Noun Sentence, Adjective Sentence, and Adverbial Sentence. Name any particular kinds of these latter sentences. Name the various forms of the Latin prefix *Ad*, meaning to. Give examples of words containing these, and show how the meaning of the word agrees with the meaning of the prefix.

Mental Arithmetic.—What is 6 times ⅛ of sixpence? ·25 of 20s.? What vulgar fraction is equal to ·75? ·125? How many times is ·125 less than ·25? What is the interest on £400 for 6 months @ 4 %? ·3 of 9s. is how much? Divide 12s. between A and B, giving A 3s. more than B. What is B's share?

STANDARD VII.

Arithmetic.—1. Find the simple interest on £960 for 3 years 219 days at 5 per cent. per annum.

2. Simplify. $\dfrac{1\frac{3}{4}+4\frac{3}{4}-1\frac{1}{2}-2\frac{1}{2}}{\frac{3}{17}\quad 2\frac{1}{2}\quad 5}$

3. In a town of 5,000 people 75 died in one year. What was the percentage of deaths in that town?

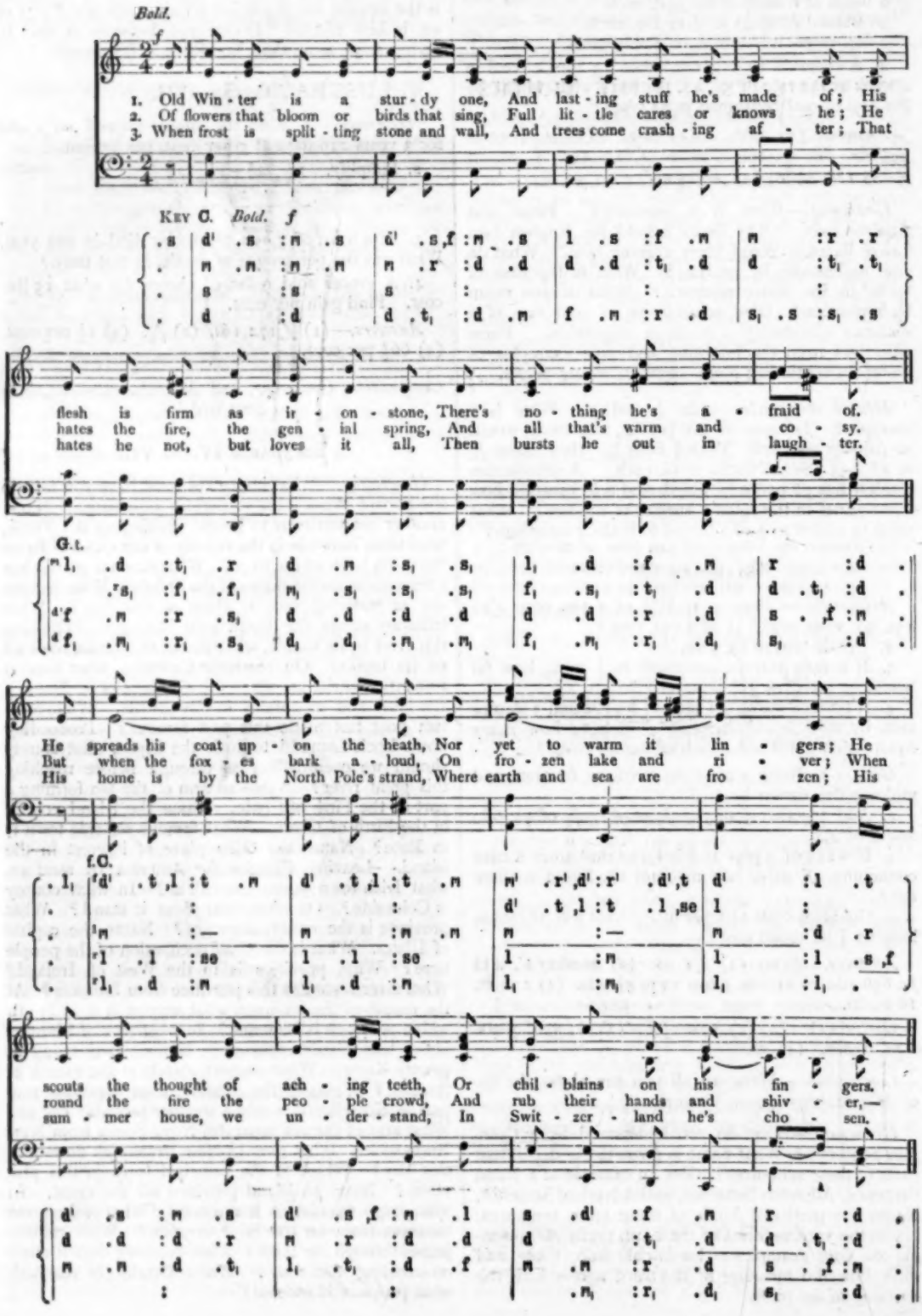
4. A grocer sold 9 lbs. of cheese for what 15 lbs. cost. Find gain per cent.

Answers.—(1) £172 16s. (2) $\frac{3}{34}$. (3) 1½ per cent. (4) 66⅔ per cent.

Composition, Grammar, and *Mental Arithmetic* same as Standard VI.

STANDARDS IV. TO VII.

Geography.—What important town have you near to the Forth? What is the seaport for Edinburgh? Name another seaport near to Leith. Sailing up the Forth, what town have you in the vicinity of the Ochil Hills on the south bank of the river? What Scottish patriot has a monument on the slopes of the Ochils? What famous spa or watering-place is there at the foot? What tributary enters the Forth near Stirling? Following this river to its source, what places of interest have we on its banks? On reaching Culloden, what famous romantic district are we at the entrance of? Name a few lakes and mountains in this district. What Scottish poet has made this part famous? Proceeding down Loch Lomond towards the Clyde, what county should we eventually pass through before reaching this great river? Name an arm of the sea forming a part of the Firth of Clyde. Name the island county in the Firth of Clyde. What famous sea-side town is in Bute? Name any other place of interest in the island. Leaving Glasgow for America by steamer, what Irish town would you call at? In what county is Coleraine? On what river does it stand? What province is the county a part of? Name the capital of Ulster. What is the chief occupation of the people here? What province is in the West of Ireland? What river separates this province from Leinster? At the mouth of the Shannon what seaport is there? In which province is Limerick? In what part of Munster is the lake district situated? Name a river rising in county Kerry. What seaport stands at the mouth of the Lee? Crossing the Atlantic, what important seaport in Nova Scotia would a steamer probably call at? What arm of the sea separates Nova Scotia from New Brunswick? What river in New Brunswick flows into this bay? Which is the principal town in this province? Name an island province off the coast. In what large opening is it situated? What is the great business town on the St. Lawrence? What railway passes through the town? What province does it enter on crossing the river? When Ottawa is reached, what province is entered?

OLD WINTER.

Bold.
1. Old Win - ter is a stur - dy one, And last - ing stuff he's made of; His
2. Of flowers that bloom or birds that sing, Full lit - tle cares or knows he; He
3. When frost is split - ting stone and wall, And trees come crash - ing af - ter; That
KEY C. Bold. f
flesh is firm as ir - on - stone, There's no - thing he's a - fraid of.
hates the fire, the gen - ial spring, And all that's warm and co - sy.
hates he not, but loves it all, Then bursts he out in laugh - ter.
G.t.
He spreads his coat up - on the heath, Nor yet to warm it lin - gers; He
But when the fox - es bark a - loud, On fro - zen lake and ri - ver; When
His home is by the North Pole's strand, Where earth and sea are fro - zen; His
f.C.
scouts the thought of ach - ing teeth, Or chil - blains on his fin - gers.
round the fire the peo - ple crowd, And rub their hands and shiv - er,—
sum - mer house, we un - der - stand, In Swit - zer - land he's cho - sen.

Notes of a Lesson on the Movement of the Earth causing Day and Night.

BY JOSEPH H. COWHAM, F.G.S.,

Lecturer on School Method: Westminster Training College.

EXPERIMENTS AND THE TRUTHS THEY TEACH.

A. Experiment with a lamp and ball.

Place a lighted lamp on a table. Then take a large ball and enclose the half of it turned away from the lamp in a paper screen in the form of a cylinder.

Turn the ball round slowly until a point A returns to its first position opposite the light.

Results to be observed and stated:—

One half of the ball is always in the light and one half in the dark.

Every point on the surface of the ball is in turn half its journey round in the light, and half in the dark.

B. Repetition of the above experiment by means of the globe and a light, in explanation of the recurrence of Day and Night.

1. Take an ordinary terrestrial globe and hold it in front of the light. The scholars are to imagine that the light is the sun and the globe is the earth. The following truth is in this way illustrated and should be stated, viz.:—

That one half of the globe is in the light and this protion represents Day; the opposite half of the globe is in the shade and this portion represents Night.

2. Turn the globe slowly round until the point directly in front of the light returns again to the same position. The globe has rotated once and as a result it should be evident to the class that:—

Any place on the rotating globe travels half round in the light, *i.e.*, *in the Day*, and half round in the dark, *i.e.*, *in the Night*.

ILLUSTRATIONS AND HOW TO USE THEM.

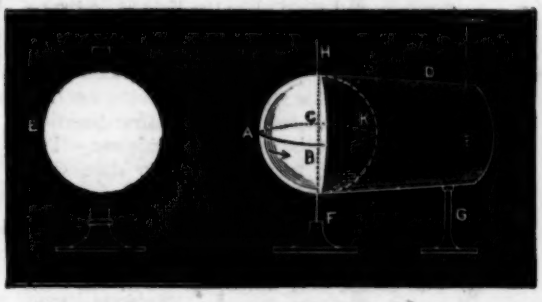


Fig. 1. Sketch of a simple model designed to perform experiment 1.

E is an ordinary lamp.

A is a ball about the same size as the globe of the lamp.

D is a paper screen representing the shadow which covers one half of the ball and stretches away behind it.

F and **G** are wire mounts. They hold the ball and the screen in position and allow the teacher's hands to be free to turn the ball by means of the extended wire at **H**.

N.B.—This lesson is often spoiled by the teacher attempting to hold his apparatus in his hands whilst giving the lesson.

The results ought to be stated by the class in answer to questions. If the class cannot state them the experiment must be repeated until they are known and stated.

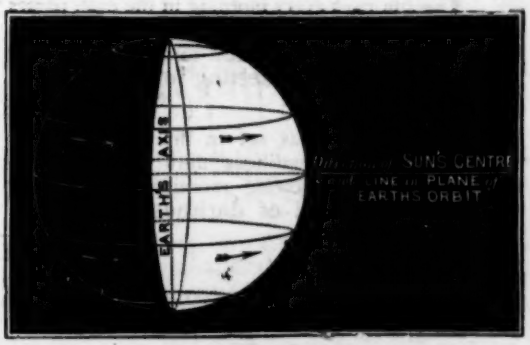


Fig. 2. A globe held before a light to show the light and the dark parts respectively.

Then slowly rotated to illustrate the change from night to day and *vice versa*.

This is a slight variation of experiment 1. Only slow progress must be expected in this lesson, and only by a series of graduated experiments such as these can the class be led to grasp the movements of the earth, which on account of their magnitude are beyond the actual observation of the learner.

The truths taught are not perfectly grasped until they can be stated in the scholar's own words.

C. The beginning, end, and course of a point on the globe in the light and the dark respectively.

1. Select a point on the dark half of the globe and then slowly rotate towards the lighted portion of the globe. The class to watch carefully and state when the light is first seen from the point selected.

2. Turn the point round in the same direction until the light is ready to disappear. The class, or some member of it, to state when the light becomes hid from view.

3. The course over which the point has been carried from the position where the light became first visible to that where it disappeared is the light or *day* course. Thence round again to the light is the dark or *night* course.

D. Application of the above truths in explanation of the chief phenomena of Day and Night.

1. *Apparent movements.*

The sun rises every morning in the east, passes across the heavens and then sets in the west. **The progress of the sun over the sky from rising to setting forms the Day.**

After the sun has set in the west, darkness begins and continues until the sun reappears the following morning in the east; **this interval of darkness forms the Night.**

2. *Real movements causing Day and Night.*

The earth by its rotation causes the sun to rise and to appear to cross the heavens and then to set in the west, and this movement of the earth **causes the recurrence of Day and Night.**

E. Terms and Definitions.

1. *Diurnal movement* is the name given to the rotatory motion of the earth which causes Day and Night.

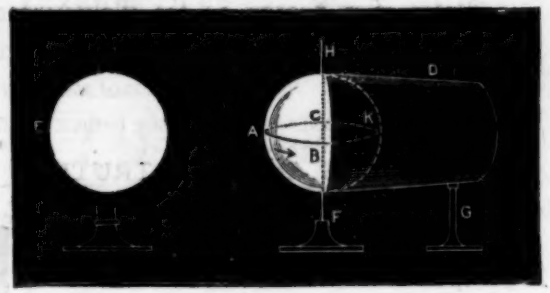


Fig. 3. Use again the model first presented to the class.

Direct attention to K. As this cannot be seen on account of the screen, its position may be noted by means of a diagram like the above drawing made on the blackboard.

1. Bring slowly the point K from beneath the screen to C, where the light first becomes visible.

Repeat this operation by allowing different scholars to turn the ball by the wire at H until the letter K marked on the ball comes into the light.

2. Similarly allow members of the class to rotate the ball until various points selected by themselves are brought to the position where the light disappears.

3. Then allow others to take a place through the entire light course; and similarly through the dark course.

The scholars observe these apparent movements many days in the year, and although they may not be able to give reasons for them they will state the facts in reply to the teacher's questioning.

The children must be encouraged to state their notions of a complete day and night in their own words, the teacher should only perfect their statement when the notions are evidently grasped. Full statements such as those on the left may afterwards be written on the board and repeated by the class.

Fig. 4. A globe half enclosed in a screen to be used in the same way as the ball in Fig. 3. The scholars to indicate positions at which the sun is *rising* and *setting*, also where it is *midday* and where on the globe it is *midnight*.

By contrast with a globe that is stationary bring out the notion that in order to cause the sun to rise and set at any place **the globe must rotate.**

2. *Axis.* In rotating a ball or globe there is a line running through the sphere which does not move. **This line of no movement is the axis.**

3. *Poles.* The ends of this axis are termed the North and South Poles respectively.

Supply the term for this rotatory movement and show the position of the **axis** and of the **poles.** The class should be encouraged to attempt simple definitions of each term.

BLACKBOARD SKETCH.

1. A sphere or ball when turned towards the light has one half its surface **in the light**; the other half is **in the dark.**
2. By rotating the ball every place in turn is half its journey in the light and the remaining half in the dark.
3. Similarly a globe representing the earth may be shown to be half in the light and half in the dark, and by moving the globe round, every place moves half its course in the light and half in the dark. **The light course represents the Day, the dark course the Night.**
4. The sun appears to rise, to cross the heavens, and to set.
5. These appearances are due to the earth rotating once every twenty-four hours.
6. This rotatory motion is called the **Diurnal movement.** The line of no movement is called **the earth's axis. The ends of this axis are the poles.**

How a Scotch School was Examined.

AFTER looking over the log-book and reading the last report, H.M. Inspector asked for a list of the school songs, of which a list of seven, besides several rounds, was placed in his hands. Previous to singing two songs, one of which was selected by him and one by the children, a Modulator Exercise, a Time Exercise, and an Ear Test, were given.

Modulator Exercise for IV., V., and VI.:—Key C. **f r fe s t l se l d t l d ta l t r' d f fe s m l, t r d s m r l r d.**

That given to II. and III. was easier, no semi-tones being asked.

Voluntary Ear Test on School Harmonium:—**d m r d; f l s m; r f r d; d' s m d; r d t, d.**

Time Test.—

| 1 : — : 1	| — : — : 1	| 1.1 : 1.1 : 1	| — : — : 1 |
| 1.1 : — : 1	| 1 : — .1 : 1	| 1 : — : — ||	

Infants and Standard I. sang together an easy exercise on Modulator:—**d r m d m s d f l d r d s m d m d.**

One song was asked from Infants and one from Standard I.

INFANTS.

While these were being examined the higher Standards were allowed to go out to the playground under charge of the pupil teachers.

1st Class of Infants read a sentence from Blackie's Graded Primer II. and spelled a word round; with a few easy questions on matter read.

Writing.—Wrote their names and the name of the village they belonged to, as well as a few easy words to dictation—*e.g.*, father, mother, sister, brother.

Arithmetic.—Numbers, such as 20, 19, 17, 15, 9, 10, were dictated to be put down on slates. Mental Arithmetic: 9 + 5? 19 + 5? 7 + 6? 17 + 6? 27 + 6? 3 + 5? 13 + 5? 23 + 5? &c., 7 − 3? 17 − 3? 27 − 3? 15 − 9? 25 − 9? &c., 7 and 3 and 2? 8 and 4 and 5? &c.

2nd Class read from Blackie's Graded Primer I. one sentence, or one line each.

Writing.—Inspector asked for the name of a child beginning with C, and Cameron being given, the class was asked to write these capitals—C A M E R O N.

Arithmetic.—7 + 3? 4 + 5? 7 + 4? 4 + 5? &c., 7 − 2? 10 − 3? 9 − 5? &c., individually and collectively.

3rd Class read from Card and were jocularly questioned about the 'pig' and the 'dog' that ran at the 'pig.'

Writing.—They were asked to write a, b, c, d, and the letters for 'pig' and 'dog.'

Arithmetic.—Very simple, *e.g.*, 2 and 1? 3 and 2? 5 and 2? 7 and 1? &c., 7 − 1? 5 − 4? 6 − 3? 5 from 5? &c. How many legs has a chair? A dog has one leg cut off, how many left?

STANDARD I.

Reading.—Boys read from school set and girls from their own set. Questions on subject matter asked from girls, and questions on grammar of nouns asked from boys.

Writing.—Inspector was pleased to see the slates ruled with a slight margin, and on being told that they had been accustomed to doing a little dictation he dictated the following short sentence: 'Mother! I am going just now to see the town.'

Arithmetic.—The pupils being placed so as to prevent copying, the following sums were dictated in words:—

1. 700 + 51 + 251 + 809 + 777. 2,588. Ans.

2. 898 + 765 + 578 + 758 + 888. 3,887. Ans.

3. 700 − 209. 491. Ans.

STANDARD II.

Reading.—Boys read from the home set, and girls from the school set. Intelligence was tested by batches of eight or nine. Grammar of nouns, adjectives and verbs was professed, and the Inspector was very pleased to test them on these parts of speech.

Dictation.—'The handle is turned round; the boards strike the cream and move or churn it about; and small lumps of butter begin to come.'

Arithmetic.—The pupils being so arranged as to prevent copying the following sums were dictated, partly in words and partly in figures:—

1. 5,090 + 9,009 + 8,800 + 9,878 + 8,765 + 9,787 + 8,686. 60,015. Ans.

2. 90,091,547 − 8,985,768. 81,105,779. Ans.

3. 75,836,490 × 6. 455,018,940. Ans.

STANDARD III.

Reading.—(Royal Reader, No. III.)—Lessons were taken at random. Each pupil read a few lines and was asked for explanation of words and phrases.

Analysis.—Inspector asked pupils to make short sentences with subject and predicate, and then with subject, predicate, and object. He put together a predicate and an object, and asked if that was a sentence.

Dictation.—This was not difficult—five lines were given without any catching words in them.

Geography was taken with Standard IV. and confined chiefly to Perthshire; a few general questions on Lanarkshire, Renfrew and Ayr.

History.—A pupil teacher was asked to examine the class on the History of Mary, as a test of ability to teach.

Poetry.—Each recited a verse, but no meanings were required.

Arithmetic:—(1) Multiply nine hundred and eight thousand five hundred and seventy-six by six thousand and ninety-eight. 5,540,496,448. Ans.

(2) Divide 45,730,658 by nine thousand four hundred and seven. $4,861\frac{3231}{9407}$. Ans.

(3) Divide one million by seventeen. $58,823\frac{9}{17}$. Ans.

(4) Add together £204 12s. 6½d. + 19s. 10¼d. + £1 0s. 5¾d. + 2½d. + £1000 10s. £1207 3s. 1d. Ans.

STANDARD IV.

Reading.—Similar to Standard III. Lessons at random from Royal Reader, No. IV., with meanings of words and phrases.

Analysis was taken from the poem professed—full parsing, or nearly so, given of each successive word.

Geography.—This was the same as Standard III., which see.

History.—Reign of William III. and Mary II. William's personal appearance asked about—Qualities as a General—His apparent dulness everywhere but on the field of battle.

Poetry.—As in Standard III.

Arithmetic.—

1. How many steps of 3 ft. 3 in. each will a man take to walk 13 miles? 21,120 steps. Ans.

2. Take 3 qrs. 14 lbs. from 1 ton. 19 cwt. 0 qrs. 14 lbs. Ans.

3. Find how much it will take to pay 120 men for three week's work at the rate of 2s. 6d. each working day. £270. Ans.

4. How many sq. yards in 3 sq. miles? 9,292,800 sq. yds. Ans.

STANDARD V.

Reading.—(Chambers' Graduated, No. 5), similarly to Standards III. and IV.

Essay.—Story read from a sheet of note paper to V. and VI. A German Love Story.

Grammar.—Taken from poem professed, viz., 'Parting of Marmion and Douglas'—Scott's 'Marmion.'

History.—Questions on George I. and George II.

Geography.—Australia: Physical features and productions—chief towns in New South Wales and Victoria: Map-drawing professed—Iberian Peninsula—Scandinavia—Australia (these were not asked for).

Arithmetic:—(1) In a village there live seventeen cottagers; in another 25; in another 42; how much will each take in one square mile two roods? 7 a. 2 r. 20 p. Ans.

(2) Find by practice the value of 211½ yards at 17s. 8½d. per yard. £187 5s. 3¾d. Ans.

(3) Make out the following bill:—
4 curtains at £1 13s. 4d. per pair.
6 rugs at 10s. 2½d. each.
15 yds. stair-cloth at 2s. 7¼d. per yd.
36½ yds. stair-carpet at 5s. 9d. per yd.
£3 6s. 8d. + £3 1s. 3d. + £1 19s. 0¾d. + £10 9s. 10½d. = £18 16s. 10¼d. Ans.

(4) Add $\frac{3}{15}$ to $\frac{2}{30}$ of $\frac{6}{8}$, and divide the result by $\frac{4}{5}$ of $\frac{2}{3}$. $\frac{15}{32}$. Ans.

STANDARD VI.

Reading.—Extract from the 'Merchant of Venice' at the end of Star Reader, No. 6.

Grammar.—Taken from the same portion of Reading Book. Formation of words a special feature.

Geography.—Taken with Standard V., with a few questions on China and East Indian Archipelago added.

History.—A few questions on the reigns of George IV. and William IV., along with leading statesmen and authors.

Arithmetic.—(1) If I give $\frac{2}{3}$ of my money to John, and the half of the remainder to James, how much have I left? $\frac{1}{6}$. Ans.

(2) Bring 5 lbs. 4 oz. to the decimal of a hundredweight and £·3875 to the decimal of a guinea.

(*a*) ·046875. (*b*) ·369047619. Ans.

(3) Find the interest on £390 12s. 6d. for 13 years at 3 per cent. £152 6s. 10½d. Ans.

Registers, Daily and General, tested for attendances and index numbers.

—o—

Quarterly Arithmetical Tests.

STANDARD I.—FIRST QUARTER.

1. 140, 72, 9, 306, 51

2. 681, 341

3. 429, 5

4. 12 × 2; 3 × 7; 6 × 4.

SECOND QUARTER.

1. 47, 205, 63, 518, 392

2. 130, 70

3. 514, 408

4. 5 × 10; 8 × 3; 4 × 11.

THIRD QUARTER.

1. 9, 670, 38, 945, 86

2. 638, 159

3. 192, 97

4. 8 × 4; 6 × 7; 9 × 5.

STANDARD II.—FIRST QUARTER.

1. 746 + 15,090 + 3,982 + 48,607 + 39 + 80,514.

2. Take 35,062 from 45,061.

3. 98 × 106.

4. 29d.; 45d.; 76d.

SECOND QUARTER.

1. Divide 28,530 by 5. Write the answer in words.

2. 7,698 × 591.

3. It took 370 bricks to pave a street the first day, 490 the second day, and twelve hundred bricks were used in three days. How many were used on the third day?

4. 87d.; 110d.; 128d.

THIRD QUARTER.

1. Multiply 58,079 by four thousand and eighty.

2. In a school there are 78 boys, 65 girls, and 90 infants. If half the infants were absent, and all the boys and girls were present, how many children would there be at school?

3. 87,648 ÷ 11.

4. 116d.; 134d.; 140d.

STANDARD III.—FIRST QUARTER.

1. Divide 258,020 by 38.

2. A gardener planted three thousand cabbages; one quarter of them died, and he sold 93 score. How many had he left?

3. How many times is 269 contained in half a million plus seventy-one?

4. How many buses, each able to hold 74 children, will be required to carry 1,607 boys and 1,205 girls to a school treat?

SECOND QUARTER.

1. Take four hundred and three pounds seven shillings and eight pence farthing from one thousand and two pounds five shillings and three pence three farthings.

2. How many must be subtracted from 49 score to leave 58 dozen?

3. £419 18s. 10¾d. + £596 13s. 7½d. + £280 16s. 11¼d. + £675 12s. 8¾d. + £328 15s. 6d. + £934 19s. 9½d.

4. A ship carried five hundred barrels of oil. In a storm 79 were thrown overboard, and the remainder were sold at £18 each. How much was received for them?

THIRD QUARTER.

1. What is the sum of seven thousand and sixteen pounds fifteen shillings and eight pence halfpenny, nine hundred and eight pounds seven shillings and eleven pence three farthings, fifty-nine pounds fourteen shillings and five pence half-penny, four pounds eighteen shillings and six pence farthing, nineteen shillings and ten pence halfpenny, seven pence farthing, and three farthings?

2. Divide the product of 513 and 516 by the quarter of 304.

3. Find the difference between £59,708 18s. 5¾d. and £60,450 16s. 2½d.

4. How much would be taken for 500 cups of tea at a penny a cup, and 300 cups of cocoa at two pence a cup?

STANDARD IV.—FIRST QUARTER.

1. £759 13s. 8¼d. × 94.

2. Find the cost of 378 yards at 9¾d. a yard.

3. Divide £74 10s. 7½d. by 75.

4. The rent of a house is £652 8s. 9d. per annum. How much must be saved daily to pay the rent?

SECOND QUARTER.

1. How many farthings must be added to 4,907 pence to make 30 guineas?

2. Find the difference in yards between 3 miles 7 fur. 34 po. and 5 miles 968 yards.

3. How many drams are there in 3½ cwt.?

4. Three pieces of cloth, each containing 38 yards, cost £73 7s. 9d.; what was the price per yard?

THIRD QUARTER.

1. Reduce nine hundred and twenty-one thousand six hundred square poles to square miles.

2. If a lady gave 15 guineas for silk at 8s. 9d. per yard, how much did she buy?

3. How many pints are there in 17 barrels, each containing 36 gallons?

4. A clock loses 3 min. 28 sec. daily; how many seconds will it lose during the month of January?

STANDARD V.—FIRST QUARTER.

1. Find the value of 8,347 tons of coal at 9s. 8½d. per ton.

2. A dealer bought 45 qrs. 6 bus. 2 pks. of wheat at 45s. per quarter, and sold it at £3 2s. 8d. per quarter. What was his gain?

3. How much would 7 cwt. 2 qrs. 22 lbs. cost at £5 16s. 8d. per ton?

4. What is the value of 15,780 articles at £15 13s. 5¾d. per score?

SECOND QUARTER.

1. If the keep of 7 horses for 3 weeks were 19 guineas, what would be the cost for the keep of 12 horses for the same time?

2. Make out a bill for:—
   7½ lbs. beef at 9½d. per lb.;
   5 lbs. lamb at 11½d. per lb.;
   11¾ lbs. mutton at 10d. per lb.;
   6⅛ lbs. veal at 10½d. per lb.;
   9¼ lbs. suet at 7d. per lb.

3. What are the wages for 5 days 7 hrs. 25 min. at 7s. 6d. per day, a day's work being 10 hours?

4. Two men earn as much as 3 women, and 5 women earn as much as 8 boys. If a boy earn 3s. 4d. a day, what does a man earn?

THIRD QUARTER.

1. Add $\frac{5}{6}$ of £1 and $\frac{5}{6}$ of a shilling.

2. Bill:—
   17 casks of butter at £3 12s. 6d. each;
   13 score eggs at 5 for 6d.;
   29½ lbs. of cheese at 7d. per lb.;
   35¾ lbs. of ham at 6½d. per lb.;
   11 ducks at 5s. 9d. per couple.

3. Simplify:—$(\frac{3}{4} + \frac{5}{6}) - (\frac{2}{3} + \frac{1}{6})$.

4. If 32 cwt. 2 qrs. 8 lbs. are carried 225 miles for three guineas, how far should 25 cwt. 1 qr. 22 lbs. be carried for the same money?

STANDARD VI.—FIRST QUARTER.

1. Simplify:—$(2\frac{5}{8} + 3\frac{5}{6} - 1\frac{5}{12}) \div 4\frac{1}{3}$.

2. What number bears the same ratio to 3·5 as 16 does to 14?

3. Add together $\frac{1}{3\cdot14}$ and $\frac{1}{3\cdot41}$, and give the answer in decimals to four places.

4. Divide $\dot{7}\cdot\dot{4}\dot{5}$ by $\cdot\dot{0}6\dot{1}5$.

SECOND QUARTER.

1. Reduce £4 2s. 8½d. to the decimal of 5¼ guineas.

2. Find the value of 18·975 acres.

3. A train goes 58⅔ feet in a second. How long will it take to go from London to Sheffield, a distance of 137 miles?

4. Add together £·59375, ·375 of a guinea, and ·0975 of £2 10s.

THIRD QUARTER.

1. What is the simple interest on £975 12s. 6d. at 2½ per cent. for 3 years?

2. What is the value of $£\frac{4\cdot98375}{\cdot075}$?

3. What sum will gain £157 10s. in a year at 4½ per cent.?

4. If ⅝ of an estate be worth £2,975, find the value of half an estate a quarter as large.

STANDARD VII.—FIRST QUARTER.

1. Find the amount of £395 for 19 years at 3½ per cent.

2. If 6 men earn 10 guineas in 8¾ days, working 9 hours per day, how much will 15 men earn in 7⅗ days, working 10½ hours per day?

3. Simplify:— $\frac{4}{7\frac{1}{2}} + \frac{\frac{1}{8} + \frac{1}{6} - \frac{1}{10}}{\frac{1}{8} \text{ of } \frac{1}{6} \text{ of } \frac{1}{10}} - \frac{1}{9}$.

4. The cost of keeping 18 horses is at the rate of £8 15s. per week. Find the cost of keeping 34 horses from June 1st to August 23rd, both days inclusive.

SECOND QUARTER.

1. In what time will £650 gain £116 3s. 9d. at 3¼ per cent.?

2. The population of a town was 47,635. Nineteen years later it had increased to 92,741. What was the average increase per annum?

3. Find the value of 6·1875 of 7 guineas.

4. In a school of 400 children, $\frac{3}{16}$ pay 3d., $\frac{3}{4}$ pay 4d., and the remainder pay 6d. What is the average fee for each child?

THIRD QUARTER.

1. A jeweller bought a watch for £15 12s. 6d., and sold it for 20 guineas. What was his gain per cent. if £1 17s. 6d. be reckoned for expenses?

2. If a grocer lose 20 per cent. by selling sugar at 2½d. per lb., what will he gain per cent. by selling it at 3⅓d. per lb.?

3. What principal will amount to £694 9s. in 292 days at 4 per cent.?

4. In a war 17 per cent. of the soldiers were wounded, and 12 per cent. were killed. If 67,308 remained out of an army, what was the original number?

ANSWERS.

STANDARD I.

	FIRST.	SECOND.	THIRD.
1.	578.	1,225.	1,748.
2.	340.	60.	479.
3.	424.	106.	95.
4.	24; 21; 24.	50; 24; 44.	32; 42; 45.

STANDARD II.

	FIRST.	SECOND.
1.	148,978.	5,706.
2.	9,999.	4,549,518.
3.	10,388.	340 bricks.
4.	2s. 5d.; 3s. 9d.; 6s. 4d.	7s. 3d.; 9s. 2d.; 10s. 8d.

	THIRD.	
1.	236,962,320.	3. 7,968.
2.	188 children.	4. 9s. 8d.; 11s. 2d.; 11s. 8d.

STANDARD III.

	FIRST.	SECOND.	THIRD.
1.	6,790.	£598 17s. 7½d.	£7,990 17s. 2½d.
2.	390 cabbages.	284.	3,483.
3.	1,859 times.	£3,236 17s. 5¾d.	£741 17s. 8¾d.
4.	38 buses.	£7,578.	£4 11s. 8d.

STANDARD IV.

	FIRST.	SECOND.
1.	£71,410 6s. 7½d.	10,612 farthings.
2.	£15 7s. 1½d.	2,761 yards.
3.	19s. 10½d.	100,352 drams.
4.	£1 15s. 9d.	12s. 10½d.

THIRD.

1. 9 sq. miles.
2. 36 yards.
3. 4,896 pints.
4. 6,448 seconds.

STANDARD V.—FIRST.

1. £4,051 15s. 5½d.
2. £40 9s. 4½d.
3. £2 4s. 10½d.
4. £12,366 15s. 0¾d.

SECOND.

1. £34 4s.
2. 5s. 11½d. + 4s. 9½d. + 9s. 9½d. + 5s. 8½d. + 5s. 4¾d. = £1 11s. 7½d.
3. £2 3s. 0¾d.
4. 8s.

THIRD.

1. 17s. 6d.
2. £61 12s. 6d. + £1 6s. + 17s. 2½d. + 19s. 2¾d. + £1 11s. 7½d. = £66 6s. 6¾d.
3. ½.
4. 288 miles.

STANDARD VI.

	FIRST.	SECOND.	THIRD.
1.	$1\frac{57}{576}$.	·75.	£68 5s. 10½d.
2.	4.	18 ac. 3 ro. 36 po.	£66 9s.
3.	·0044...	3 hrs. 25½ min.	£3,500.
4.	12·12.	£1 4s. 7½d.	£446 5s.

STANDARD VII.

	FIRST.	SECOND.	THIRD.
1.	£657 13s. 6d.	5½ years.	20 per cent.
2.	£26 16s. 8d.	2,374.	12 per cent.
3.	80½.	£45 9s. 6¾d.	£672 18s. 4d.
4.	£198 6s. 8d.	$4\frac{7}{10}$d.	94,800 soldiers.

Tests in Mental Arithmetic.

STANDARD I.

1. Take 47 from 50. 3.
2. How many are 3 times 9 + 13? 40.
3. Divide 40 marbles among 5 boys; how many is that for each boy? 8.
4. After paying 5d. for sugar, 3d. for soap, and 2d. for rice, what change would be left out of a shilling? 2d.
5. How many panes of glass are there in five windows, if there are 9 panes in four windows, and 12 in the other? 48.
6. What silver coin could you get for 48 farthings? Shilling.
7. How many times can 7 be taken from 42? 6.
8. I had a florin, and bought 10 penny stamps and 12 halfpenny ones; how much had I left? 8d.
9. How many score are there in 60? 3.
10. What are 10 times 5? 50.
11. How much are 50d.? 4s. 2d.
12. How much more is required to make a crown? 10d.

STANDARD II.

1. Add 26 and 17. 43.
2. Take 43 from 100. 57.
3. How many pence more than two florins are 57d.? 9d.
4. How many are twice 19? 38.
5. What is the half of 19? 9½.
6. Find the cost of 6 lbs. of sugar at 2½d. per lb. 1s. 3d.
7. What change would be received out of a crown? 3s. 9d.
8. Take 8½d. from 11¼d. 2¾d.
9. How much are 4 times 2¾d.? 11d.
10. What is the difference between 11 farthings and 3½d.? ¾d.
11. If I posted a letter daily during December, how much would the postage amount to? 2s. 7d.
12. What would a dozen glasses cost at 4½d. each? 4s. 6d.

STANDARD III.

1. What would 70 oranges cost at 2 a penny? 2s. 11d.
2. Find the cost of 3 lbs. of beef at 8½d. per lb. 2s. 1½d.
3. What change would be received out of half-a-crown? 4½d.
4. Reduce 5 half-crowns to pence. 150d.
5. What would ¼ lb. tea cost at half-a-crown per lb.? 7½d.
6. How many sixpences are equal to £4 15s.? 190.
7. How many more are required to make 11 score? 30.
8. What would a pint of ale cost at a florin a gallon? 3d.
9. What is the cost of 108 tops at 1½d. each? 13s. 6d.
10. How much more would make a sovereign? 6s. 6d.
11. If 7 lbs. of mutton cost 6s. 5d., what is that per lb.? 11d.
12. If a clock lose 3 minutes daily, in how many days will it lose an hour? 20 days.

STANDARD IV.

1. How many fourpences are there in a guinea? 63.
2. What is the quarter of a thousand? 250.
3. Find the value of 250 halfpenny papers. 10s. 5d.
4. How many minutes are there in 1¾ hours? 105.
5. How many florins could you get for £5? 50.
6. What is the cost of half a lb. of tea at 2½d. per oz.? 1s. 8d.

7. How many pounds of tea at that price could you get for £3? 36.

8. What are a boy's wages for a fortnight at 2s. 3d. a day? £1 7s.

9. How many half-pints are there in 3½ gallons? 56.

10. A blackboard is 5 ft. long and 4 ft. broad; what is the area? 2 sq. yds. 2 ft.

11. A shopkeeper bought 60 eggs at 3 for 2d., and sold them at a penny each; how much did he gain? 1s. 8d.

12. How many lbs. of soap could be bought for half-a-crown, if 6 lbs. cost 1s. 6d.? 10.

STANDARD V.

1. If ¼ yard cost 7d., what would 2½ yards cost? 5s. 10d.

2. How many dozen are there in 15 score? 25.

3. If a ton cost £3 10s., what would 3½ cwt. cost? 12s. 3d.

4. If it were £1 per ton, how much could you get for that amount? $31\frac{1}{16}$ cwt.

5. If a man owe £1,000, and pay 5s. 6d. in the pound, what is the value of his assets? £275.

6. A bankrupt owes £800, and is worth £600; how much can he pay in the £? 15s.

7. What part of a sovereign is the half of 15s.? $\frac{3}{8}$.

8. What is the difference between $\frac{3}{8}$ and ¼? $\frac{1}{8}$.

9. How many inches are there in ¾ of a yard? 27.

10. If 5 pair of boots cost £1 15s., what will 1½ dozen pair cost? £6 6s.

11. What is the interest on £625 for a month at 4 per cent.? £2 1s. 8d.

12. If an article cost £2 1s. 8d., and be sold at a gain of 10 per cent., what is the selling price? £2 5s. 1cd.

STANDARDS VI. AND VII.

1. How many lbs. of sugar could be bought for 1s. 8d., if 6 lbs. cost 1s. 3d.? 8.

2. What decimal of a shilling is 8d.? ·6.

3. What is the interest on £150 for 2½ years at 3 per cent.? £11 5s.

4. What sum will gain £10 in a year at 4 per cent.? £250.

5. How much is ·325 of half a-sovereign? 3s. 3d.

6. Which is the greater ·325 or $\frac{2}{5}$? $\frac{2}{5}$.

7. Express the difference as a decimal. ·075.

8. How many times can ¾ be taken from 7½? 10.

9. If 4 men earn £3 1cs. in 3 days, how much would 12 men earn in 9 days? £31 10s.

10. What percentage of a score is a dozen? 60 per cent.

11. Divide a shilling between a boy and girl, giving the girl 3d. more than the boy. 4½d. and 7½d.

12. What is the selling price of an article which cost half-a-sovereign, and is sold at a gain of 250 per cent.? £1 15s.

Model Answers to Pupil Teachers' Examination Papers.

October 20th, 1888.

END OF SECOND YEAR.

Euclid.

(*Three hours and a half allowed.*)

BOYS ONLY.

[All generally understood abbreviations and symbols for *words* may be used, but not symbols of *operation*, such as −, +, ×.]

(*Answer two questions, including Question 3, if you can do so.*)

1. The angles at the base of an isosceles triangle are equal to one another.

First part of Prop. 5, Euclid, Book I.

2. If two triangles have two sides of the one equal to two sides of the other, each to each, but the angle contained by the two sides of one of them greater than the angle contained by the two sides equal to them of the other, the base of that which has the greater angle is greater than the base of the other.

What is the object of the restriction, "of the two sides PQ. PR let PQ be not greater than PR," PQR being one of the triangles?

Euclid, Book I., Prop. 24.

To prevent the possibility of there being three cases which would require proof, for the point S might fall upon or below the base QR as well as above it.

3. The equal sides AB, AC, of an isosceles triangle, ABC, are produced to F and G, so that AF = AG. If BG, CF intersect at H, show that AH bisects the angle at A.

In Prop. 5. Euclid, Book I., it is shown that ∠ GBC = ∠ FCB. ∴ I. 6, BH = HC. ∴ Ax 3, FH = GH.

Because in two △s AF = AG, and FH = GH and base AH is common. ∴ △ AFH = △ ACH (I. 8) and ∠ AFC = ∠ ACH.

∴ I. 4, the remaining ∠s are equal, that is ∠ BAH = ∠ CAH.

∴ ∠ BAC is bisected by line AH.

Q.E.D.

Arithmetic.

GIRLS ONLY.

(*Do three questions only, including the last, if you can.*)

1. Simplify the fractions $\frac{(9\frac{3}{7} + 6\frac{1}{2} - 5\frac{17}{28}) \times 4\frac{2}{3}}{24\frac{5}{8}}$.

2. How many times will $\frac{5}{12}$ of the difference between ⅓ of 1s. 10½d. and $\frac{4}{11}$ of 2s. 6½d. be contained in two shillings?

3. Five fields containing respectively 5a. 3r., 7a. 2r., 1a. 1r., 5a. 3r., 6a. 2r., are rented for £5 5s., £8, £1 5s., £6 18s., and £6 10s. respectively; which of the fields is rented at the highest rate, which at the lowest?

4. Reduce to decimals ⅓, $\frac{7}{16}$, $5\frac{1}{3}$, and explain why $\frac{5}{11}$ cannot be reduced to a terminating decimal?

(1) $\frac{(9\frac{3}{7} + 6\frac{1}{2} - 5\frac{17}{28}) \times 4\frac{2}{3}}{24\frac{5}{8}}$

$= 10\frac{18 + 33 - 24}{42} \times \frac{14}{3} \times \frac{8}{185}$

$= 10\frac{27}{42} \times \frac{14}{3} \times \frac{8}{185}$

$= \frac{444}{42} \times \frac{14}{3} \times \frac{8}{185}$

$= \frac{2}{1}$. Ans.

(2) $\frac{2s.}{\frac{3}{13}\left(\frac{5}{8}\text{ of }1s.\ 10\frac{1}{2}d. - \frac{4}{11}\text{ of }2s.\ 6\frac{1}{4}d.\right)}$

$= \frac{96}{\frac{3}{13}\left(\frac{5}{8} \times \frac{21}{1} - \frac{4}{11} \times \frac{125}{4}\right)}$

$= \frac{96}{\frac{3}{13}(50 - 44)}$

$= \frac{96}{\frac{3}{13} \times \frac{6}{1}}$

$= \frac{13}{1} \times \frac{16}{3} \times \frac{1}{6}$

$= \frac{208}{3}$

$= 69\frac{1}{3}$. Ans.

(3) $\frac{105s.}{23}, \frac{160s.}{30}, \frac{25s.}{5}, \frac{138s.}{23}, \frac{130s.}{26}$.

$= 4\frac{13}{23}, 5\frac{1}{3}, 5, 6, 5$.

The first is lowest rented, the fourth is highest rented.

(4) $\frac{1}{7} = \cdot\frac{1}{7}$.

$\frac{7}{48} = \frac{\cdot 875}{6} = \cdot 14583$.

$5\frac{1}{7} = 5\cdot 142857$.

The only factors of 10 are 5 and 2. As 11 does not contain either of these factors, and as only 10's are to be divided there will always be a remainder, and the fraction will not terminate.

Grammar.

BOYS AND GIRLS.

(Answer questions 1 *and* 2, *and one other question.)*

1. Express, in your own words, the meaning of the last six lines of this passage:—

Still is the *toiling* hand of Care,
The panting herds *repose:*
Yet hark, how through the peopled air
The busy murmur *glows!*
The insect youth *are* on the wing,
Eager to taste the honeyed spring,
And *float* amid the liquid noon;
Some lightly o'er the current *skim*,
Some show their gaily-gilded trim
Quick-glancing to the sun.

2. Parse the words printed in italic.

3. Give three examples of an adjective sentence, and three of an adverbial sentence.

4. Explain the use and meaning of the suffix in each of the following words:—

Addition. Pacify. Intensity. Magnitude. Demonstrable.

(1) While toilers in the field and the cattle are resting in the heat of the day, the newly-born insects are too anxious to taste the sweets of life to remain still, and are all flying hither and thither. Some are skimming gently the surface of the pools and the streams, while others are showing the gaudy colours of their wings and bodies by gaily dancing in the bright sunshine.

(2) *Still*—adj. of quality, qualifying *hand.*
is—verb, irreg., intrans., act., ind., pres., 3rd sing., agreeing with its nom. *hand.*
toiling—partl. adj. of qual., qualg. *hand.*
repose—verb, reg., intrans., act., ind., 3rd plur., agreeing with its nom. *herds.*
glows—verb, reg., intrans., act., ind., pres., 3rd sing., agreeing with its nom. *murmur.*
are—verb, irreg., intrans., act., ind., pres., plur., 3rd, agreeing with its nom. *youth.*
float—verb, reg., intrans., act., ind., pres. 3rd plural, agreeing with its nom. *youth.*
some—indef. pers. pro., com., plural, 3rd., nom. to *skim.*
skim—verb, reg., intrans., act., ind., pres., 3rd, plural, agreeing with its nom. *some.*

(3) *Adjective:*
(1) The horse *which my father bought* cost fifty pounds.
(2) The place *where he resides* is on a hill.
(3) The man *who committed the crime* is apprehended.

Adverbial:
(1) I was standing *where I now stand.*
(2) I study *when I can.*
(3) I requested him to call *when he was at liberty.*

(4) Addition: *-tion* denotes an action; forms noun.
Pacify: *-fy* is a root, and means *to do* or *to make;* forms verb.
Intensity: *-ty* denotes abstract idea, and forms noun.
Magnitude: *-tude* denotes abstract idea, and forms noun.
Demonstrable: *-ble* denotes the possibility of something being done, and forms adjective.

Geography.

BOYS AND GIRLS.

(Answer three questions only, including the last, if you can.)

1. Describe the position of Belgrade, Cadiz, Copenhagen, Ancona, Rouen, Dresden, and Warsaw. Name some of the historical associations connected with three of them.

2. Describe *two* of the great mountain ranges in India, and name the rivers which rise in them or break through them.

3. How is longitude measured? Explain how a day is apparently lost or gained in a voyage round the world.

4. Enumerate the chief productions of Ceylon, Jamaica, the Straits Settlements, and the British Possessions on the West Coast of Africa.

5. Draw a map of the Northern Coast of the Mediterranean Sea, *or* of the Eastern Coast of British India.

(1) *Belgrade*, situated at the junction of the Danube and the Save: it is the Capital of Servia.

Cadiz, near the S.W. extremity of Spain, a few miles north of Cape Trafalgar. In 1805 combined French and Spanish fleets were defeated by Nelson. 19 vessels destroyed, but Nelson killed.

Copenhagen, on the Sound, island of Zealand, capital of Denmark. Danish fleet defeated by Nelson in 1801. 18 vessels taken or destroyed.

Ancona, in central Italy, on the Adriatic, occupying one of the prominent points on the East coast.

Rouen, 44 miles up the Seine from Havre. Burning of Joan of Arc, 1431. Prince Arthur murdered here, 1203.

Dresden, capital of Saxony on the Elbe, 100 miles S.E. of Berlin.

Warsaw, ancient capital of Poland, on the Vistula, same latitude as Birmingham, 21° E. longitude. Sieges in 1794 and 1831.

(2) The *Himalayas* stretch along the whole of the northern frontier of India for a distance of 1,500 miles, and extend from 100 to 300 miles in breadth. The loftiest peak is Mount Everest, about 29,000 feet in height, and is the highest peak in the world. Other heights are Chimilari, Kunchinjinga, and Dhawalagira, slightly inferior in elevation. The mountains rise in a series of ridges of varying and increasing height till they reach the central ridge, covered with perpetual snow. There are several difficult passes from India into Thibet. The chief rivers rising in the Himalayas are the Indus and the Brahmapootra on the north side, and the Ganges and its tributaries on the south side of the range. The former flows N.W., and then finds its way through the ridge near the borders of Afghanistan, while the Bramahpootra flows eastward, and breaks through the lowest part of the range into the province of Assam. The Chenab, Ravee, Beaz, and Sutlej, are the chief tributaries of the Indus, and the Jumna of the Ganges.

The *Western Ghauts* form an almost unbroken chain for ten degrees along the west coast of India, and are the sources of the Krishna and the Godaveny, which flow eastwards through the E. Ghauts into the bay of Bengal, while the Tapty flows past the north end of the range into the Arabian Sea. They rise to a height of 4,000 feet. The Neilgherry hills in the south join the E. and W. Ghauts north of the Gap of Coimbatore.

(3) *Longitude* is reckoned by degrees, which are $69\frac{1}{19}$ m. in length at the Equator, but decrease as the meridians near each other towards the poles. The first meridian for England passes through Greenwich. Places E. or W. of Greenwich are in E. or W. longitude. A place can be as much as 180° E. or W. of Greenwich. The time of places in E. long. is *before* the time of Greenwich; the time of places in W. long. is *after* the time of Greenwich. If it be 12 o'clock at noon in the latter place, it is 12 o'clock at night of the same day in 180° E. long., but 12 o'clock at night of the preceding day in 180° W. long. But these places are identical. If, therefore, we have sailed eastwards, and are proceeding westwards, as soon as we cross the meridian of 180° we pass from the day after the day at Greenwich to the day before the day at Greenwich, that is, we gain a day.

In sailing from W. to E, the process is reversed. Thus, supposing it to be the 14th in going from W. long. to E. long., the next day we should call the 16th, and we should lose a day, while going the opposite direction we should have two days of the same date, and should gain a day.

(4) *Ceylon* produces coffee, sugar, rice, cinnamon, pepper, cocoa-nuts, teak and other valuable woods. Precious stones are largely found, and off the west coast there is an extensive pearl fishery.

Jamaica grows coffee, sugar, spices, and fruits, exporting also rum and molasses.

The Straits Settlements produce the betel nut or areca palm tree, sago, pepper, nutmegs, spices, rice, teak and other timbers.

West Africa sends us gold dust, ivory, palm oil, teak, gum-arabic, coffee, sugar, cocoa-nut, rice, maize, ground nuts, ginger, pepper, and dye woods.

END OF SECOND YEAR.

(*Two hours and a half allowed.*)

Needlework.

(*One hour allowed for this Exercise.*)

GIRLS ONLY.

Herring-bone a square of flannel (6 inches square); darn, as for a thin place (12 rows).

Arithmetic.

BOYS ONLY.

(*Answer three questions only, including the last if you can.*)

1. Of 100 men, 37 earn 3s. 10d. per day, 40 earn 3s. 6d. per day; what should be the daily pay of the remainder that the average weekly pay of the whole, at five days and-a-half to the week, should be £1 2s.?

2. At what rate per cent. per annum is simple interest calculated if £395 amount to £446 16s. 10½d. at the end of 3½ years?

3. If a weight of 40,000 ounces of silver can be made into 8,000 ornaments, each worth 25 shillings, how many ornaments of gold, each worth 10s., can be made out of 8,000 ounces of gold, the ratio of the value of gold to silver being 20 : 1?

4. A sum of £3,980 Stock is converted from a 3 per cent. Stock, at 101¼, into a 2½ per cent. Stock, at 99½; find the yearly loss of income. (Neglect brokerage.)

What do you understand by a Stock being at par?

(1) Total pay 100 × 22s. = £110 0 0

Total pay for 37 = 37 × 5½ × 3s. 10d. = 39 0 1

" " 40 = 40 × 5½ × 3s. 6d. = 38 10 0

" " 23 for a week £32 9 11

" " 1 for a day = £32 9s. 11d. ÷ (5½ × 23)
= £0 5s. 1⅛d. Ans.

(2) £446 16s. 10½d. − £395 = £51 16s. 10½d. int.

∴ £395 : £100 :: £51 16s. 10½d. : 3½. Ans.
yrs. 3½ : 1

or, or,

(3) oz. 40,000 : 8,000 :: 8,000 : 80,000. Ans.
sh. 10 : 25
val. 1 : 20

(4) First income £3,980 ÷ 100 × 3 = £119⅖.

Proceeds of sale $\frac{3980 \times 101\frac{1}{4}}{100}$ = £4029⅘.

Second income $\frac{£4029\frac{4}{5} \times 2\frac{1}{2}}{99\frac{1}{2}}$ = £111 7s. 6d.

Diff. of income = £119 8s. − £111 7s. 6d.
= £8 0s. 6d. Ans.

Stock is at par when the actual value and nominal value are the same; *i.e.*, you can buy £100 Stock for £100 cash.

History.

BOYS AND GIRLS.

(*Answer three of these questions.*)

1. What were the chief provisions of Magna Charta, and by whose influence, and in what circumstances, was the Charter obtained?

2. Give some particulars respecting the First and Second Crusades, and the share England and her kings took in them.

3. Name, with dates, the chief events of the reign of Henry VI.

4. What do you know about these persons:—Drake, Spenser, Cranmer, Somerset (the Protector), and Raleigh?

(1) The chief provisions of Magna Charta were:—

(*a*) No scutage or aid could be imposed but by the common council of the kingdom.

(*b*) Common pleas were not to follow the court, but to be held in some certain place.

(*c*) No freeman could be apprehended, disseised of his freehold, imprisoned, outlawed, exiled, or sentenced, except by the lawful judgment of his peers or of the law of the land.

(*d*) Justice or right could neither be sold, delayed, nor denied to any man.

(*e*) All freemen might quit or return to the country at pleasure.

(*f*) No freeman could be fined excessively.

(*g*) No peasant or villein could be deprived of his tools or implements of husbandry.

A number of Anjevins and Poitevins, who had been allied with John during the invasion by Louis, sought an asylum in England. They secured John's favour, who gave them all the chief offices and fiefs at his disposal, thus doing dishonour to the Norman nobles. These foreigners by their exactions excited the anger of the Saxon citizens, and a national feeling sprung up between Normans and Saxons against the common tyrant, John. The barons rose in rebellion, seized London, and compelled John to sign the Charter at Runnymede, near Windsor, June 15, 1215.

(2) The first Crusade was attempted in 1096. It was undertaken for the purpose of delivering Palestine from the hands of the Saracens, who ill-treated European pilgrims to the Holy Sepulchre and other objects of religious interest in the Holy Land. William II. became mortgagee of Normandy to enable Robert the Duke to take part in it. The Crusaders captured Jerusalem, and were otherwise successful, but the city was afterwards recovered by the Saracens. The second Crusade in which England took part was in reality the third in order. Richard I. Cœur de Lion was the English king who joined this Crusade. In conjunction with Philip of France he took Acre, and the forces under Richard defeated the Saracens at Arsouf, in 1191. But the army was greatly wasted by sickness and did not attempt the recapture of Jerusalem. A truce was effected for three years, during which time the Crusaders held the seaports of Palestine, and pilgrims were not to be molested. On his way home, Richard was imprisoned, after being wrecked, by his enemy the Duke of Austria. The people of England who had suffered great exactions to find money for the Crusade, were now heavily taxed to find the money for his ransom. Richard had not been at home many months before he died, 1199.

	A.D.
(3) Bedford made Protector	1422
Dauphin crowned King of France	1422
Battle of Verneuil	1424
Siege of Orleans raised	1429
Capture of Joan of Arc at Compiegne ...	1430
Burning of Joan of Arc	1431
Normandy and Guienne over-run	1449
Rouen and Cherbourg surrendered	1450
Impeachment of Suffolk	1450
Jack Cade's rebellion	1450
Wars of the Roses	1455—1485
First battle of St. Albans	1455
Bloreheath	1459
Northampton	1460
Wakefield	1460
Mortimer's Cross	1461
Second battle of St. Albans	1461
Deposition of Henry	1461

(4) *Sir Francis Drake.*—Born 1545, died 1596. Employed in expeditions against the French and Spaniards; circumnavigated the globe; knighted on his return; one of the chief agents in the destruction of the Spanish Armada, 1588.

Edmund Spenser, 1553—1598.—One of the most celebrated of English poets. Wrote 'The Shepherd's Calendar,' and the 'Faerie Queen,' an allegorical poem in stanzas of nine lines.

Thomas Cranmer, 1489—1556, was Archbishop of Canterbury under Henry VIII. Pronounced the decree of divorce between Henry and Katharine of Arragon. Assisted in framing the present English Liturgy under Edward VI. Was burned for heresy under Mary.

Somerset was brother of Lady Jane Seymour, and Protector of England during early part of reign of Edward VI. Resigned his Protectorship; charged with raising a rebellion in the north, and of plotting to murder Northumberland, who had succeeded him; beheaded on Tower Hill, 1552.

Sir Walter Raleigh, 1552—1618.—Visited America, from whence he is said to have brought the potato and tobacco. Gained favour of Queen Elizabeth; distinguished himself at the defeat of the Armada. Took part in the Main Plot of 1603, on which plea he was executed in 1618, after a disastrous expedition to Central America. Spent above 12 years in prison, during which time he wrote a history of the world.

Teaching.

BOYS AND GIRLS.

(*Answer two questions only.*)

1. Arrange in groups the capital letters, putting together those which are similarly formed. Show in what order you would teach them, beginning with the easiest group, and proceeding to the most difficult.

2. Say exactly what are the requirements of the Code respecting Arithmetic in Standards I., II., III., and IV.; *or* (in an Infant School without a First Standard) what lessons in number can be given to the first class.

3. Explain what is the best use to make of a box of moveable letters in an Infant Class; *or* (in a school for older scholars) give some exercises in Mental Arithmetic suitable for Standard II.

(1) *Group* 1.—C, E, L, S, G.
Group 2.—Q, V, Y, Z, X, O, U.
Group 3.—I, T, J, F, A, N, M.
Group 4.—P, B, R, D, H, K, W.

The groups are arranged according to similarity of construction, as far as is practicable. The easiest capital to form is C. The others in Group 1 follow the same method of forming the loop. This is the case also with Group 2, with the exception of the letter O, which does not easily fall into any group. In Group 3 the down stroke of the I should be taught first. All the other letters partake of the same characteristic formation. Group 4 has the hardest and most complicated forms.

(2) *Standard I.*—Addition and subtraction of numbers of not more than three figures. Numeration and notation up to 1,000. In addition not more than five lines to be given. Multiplication table to 6 times 12.

Standard II.—Notation and numeration up to 100,000. The four simple rules to short division. Multiplication table and the pence table to 12s.

Standard III.—Former rules with long division, addition and subtraction of money.

Standard IV.—Compound rules (money), and reduction of common weights and measures.

Short exercises in mental arithmetic may be given in the examination of all Standards. These should not involve large numbers, should deal with concrete as abstract quantities, and should be preparatory to the work of the next higher Standard.

The lessons in number in the first class of an Infant School should consist of addition and subtraction of numbers mentally, writing numbers on slates up to 100, naming such numbers on the blackboard, working mentally questions with concrete quantities in mental arithmetic, with two and three times in the multiplication table.

(3) Children should be allowed to *pick out* the letters after learning them from the card, and themselves to form little words. This should be done with both capital and small letters. The teacher also should make use of it to show the building up of words; sentences should be formed by teacher, and spelt by the children; it should be used also for chief words in object lessons.

(*b*) (Exercises chiefly on sixes. Similar exercises should be formed on all the units.)

How many sixes make 60? What then will eleven sixes make? If I had 66 books, how many girls could get 6 each? A man has 6 rows of pennies and 11 in each row; how many pennies has he altogether? How many sixes are there in 72? If I had 72 pennies, how many boys could get 6 each?

Take 21 from 90. Add 73 and 17. From 90 take 17. What must be added to 55 to make 80? Add 9 and 12 and 21. How many times can 11 be taken from 96? How many farthings in 4½d.? in 11d.? in 10½d.? Take 7½d. from 1s. How many balls at 1½d. can I get for 6d.? for 1s.? 4 lbs. of sugar at 2d.? 5 at 3d.? Change out of 2s.? How many sixpences in a crown? In a half-crown?

END OF THIRD YEAR.

(*Three hours and a half allowed.*)

Euclid.

BOYS ONLY.

[All generally understood abbreviations and symbols for *words* may be used, but not symbols of operation, such as —, +, ×.]

(*Answer two questions, including question* 3 *if you can do so.*)

1. If a side of any triangle be produced the exterior angle is equal to the two interior and opposite angles, and the three interior angles of every triangle are together equal to two right angles. State the corollaries.

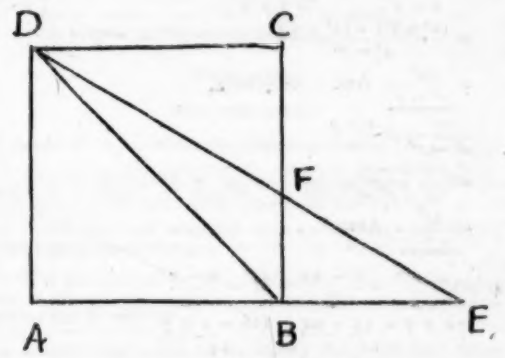
Euclid, Book I., Prop. 32.

2. Equal triangles on the same base and on the same side of it are between the same parallels.

Euclid, Book I., Prop.

3. ABCD is a square, AB is produced to any point E, and DE intersects BC at F. Show that the diagonal BD is greater than DF and less than DE.

(3)



(I. 32.) The three ∠'s of a △ are together = to two right ∠'s. But in △ DCF, ∠ DCF is a right ∠.

∴ two other ∠'s of same triangle = one right ∠.

∴ ∠ DCF is the greatest ∠ of △ DCF.

∴ (I. 18) Side DF is greater than side DC.

For the same reason DB is greater than DC.

But the exterior ∠ DFB is greater than the interior and opposite ∠ DCF, and the greater ∠ is subtended by the greater side.

∴ DB is greater than DF. In like manner it may be shown that DE is greater than DB.

Wherefore, &c.

Algebra.

BOYS ONLY.

(*Answer three questions only, including question* 4, *if you can do so.*)

1. *Prove* that $a^m \times a^n = a^{m+n}$, the letters representing any positive whole numbers. Divide $9x^4 - x^2y^2 + 10xy^3 - 25y^4$ by $3x^2 - xy + 5y^2$.

2. Find the G.C.M. of—

$12a^3 - 28a^2b + 17ab^2 - 3b^3$ and $12a^3 - 32a^2b + 25ab^2 - 6b^3$; and resolve the result into factors.

3. Add together $\frac{x^2 - xy + y^2}{x - y}$, $\frac{x^2 + xy + y^2}{x + y}$, and multiply the result by $\frac{x - y}{x}$.

4. (*a*) Solve the equation—

$$(1.)\ \frac{x+1}{3} - \frac{5-3x}{7} = 8\frac{2}{7} - \frac{x-7}{14}.$$

(*b*) A man bought a certain number of oranges at 3 for 2d., and twice that number at 10d. the dozen; by selling them all at a penny each, he gained 2s. How many did he buy?

(1) $a^m = a \times a \times a \times a$ ..... to m factors.
$a^n = a \times a \times a$:..... to n factors.
$\therefore a^m \times a^n = a \times a \times a$ to m factors.
i.e., $a^m \times a^n = a^{m+n}$.

$3x^2 - xy + 5y^2) 9x^4 - x^2y^2 + 10xy^3 - 25y^4 (3x^2 + xy - 5y^2$
$9x^4 - 3x^3y + 15x^2y^2$
$3x^3y - 16x^2y^2 + 10xy^3$
$3x^3y - x^2y^2 + 5xy^3$
$-15x^2y^2 + 5xy^3 - 25y^4$
$-15x^2y^2 + 5xy^3 - 25y^4$

(2) $12a^3 - 28a^2b + 17ab^2 - 3b^3) 12a^3 - 32a^2b + 25ab^2 - 6b^3 (1$
$12a^3 - 28a^2b + 17ab^2 - 3b^3$
$-b) - 4a^2b + 8ab^2 - 3b^3$
$4a^2 - 8ab + 3b^2$
$4a^2 - 8ab + 3b^2) 12a^3 - 28a^2b + 17ab^2 - 3b^2 (3a - b$
$12a^3 - 24a^2b + 9ab^2$
$- 4a^2b + 8ab^2 - 3b^3$
$- 4a^2b + 8ab^2 - 3b^3$

G.C.M. $= 4a^2 - 8ab + 3b^2$. Ans.
$= (2a - 3b)(2a - b)$. Ans.

(3) $\frac{x^2 - xy + y^2}{x - y} + \frac{x^2 + xy + y^2}{x + y}$
$= \frac{(x^3 + y^3) + (x^3 - y^3)}{x^2 - y^2}$
$= \frac{2x^3}{x^2 - y^2}$. Ans.
$\frac{2x^3}{x^2 - y^2} \times \frac{x - y}{x}$
$= \frac{2x^3 (x - y)}{(x^2 - y^2) x}$
$= \frac{2x^3}{x + y}$. Ans.

4. (*a*) $\frac{x + 1}{3} - \frac{5 - 3x}{7} = 8\frac{1}{2} - \frac{x - 7}{14}$
$\frac{7x + 7 - 15 + 9x}{21} = \frac{116 - x + 7}{14}$
$\frac{16x - 8}{21} = \frac{123 - x}{14}$
$32x - 16 = 369 - 3x$
$35x = 385$
$x = 11$. Ans.

(*b*) x = Number bought at 3 for 2d.
$2x$ = " " 10d. per doz.
$\frac{2x}{3} + \frac{2x \times 10}{12} = 3x - 24$.
$8x + 20x = 36x - 288$
$-8x = -288$
$x = 36$
$2x = 72$
Total bought = 108. Ans.

Mensuration.

BOYS ONLY.

(*Answer one question.*)

1. Find the area and the rent of a triangular field whose sides are 19, 60, and 73 poles, at 45*s.* the acre.

2. Find the side of a square whose area is equal to the area of a rhombus, whose diagonals are 52 feet and 416 feet.

(1) $\frac{19 + 60 + 73}{2} = 76$
$\sqrt{76 (76 - 19) \times (76 - 60) \times (76 - 73)}$
$= \sqrt{207936}$ poles.
$= 456$ poles
$= 2{\cdot}85$ acres. Ans.
$2{\cdot}85 \times 2{\cdot}25$
$= £6{\cdot}4125$
$= £6\ 8s.\ 3d.$ Ans.

(2) Area of rhombus or square
$= \frac{416 \times 52}{2} = 10816$
$\therefore$ side of sq.
$= \sqrt{10816}$
$= 104$ feet. Ans.

Arithmetic.

GIRLS ONLY.

(*Answer three questions only, including the last, if you can.*)

1. A certain number is multiplied by 3·79; and this product when divided by ·0015 gives a quotient ·001137. Find the number.

2. Divide the difference of $7\frac{1}{5}$ and $3\frac{7}{15}$ by $1\frac{2}{3}$.

3. Find the value of $5\frac{1}{4}$ of 5*s.* 6*d.* + ·125 of 8*s.* 10*d.* − $1\frac{1}{2}$*d.* of 3*s.* $7\frac{3}{4}$*d.*

4. Find a fourth proportional to $3\frac{1}{2}$, ·5, 1·75; and explain why the following proportion 3*s.* 7*d.* : 42 miles :: 7*s.* 2*d.* : 84 miles is incorrect.

(1) Quotient × Divisor = Dividend.
·001137 × ·0015 = ·0000017055
Product ÷ Multiplier = Multiplicand.
·0000017055 ÷ 3·79 = ·00000045. Ans.

(2) $(7\frac{1}{5} - 3\frac{7}{15}) \div 1\frac{2}{3}$
$= 3\frac{18 - 7}{15} \div 1\frac{2}{3}$
$= \frac{11}{15} \times \frac{3}{5}$
$= \frac{33}{75}$
$= 2\frac{8}{25}$. Ans.

(3) $5\frac{1}{4}$ of 5*s.* 6*d.* + ·125 of 8*s.* 10*d.* − $1\frac{1}{2}$ of 3*s.* $7\frac{3}{4}$*d.*
$= \frac{21}{4} \times \frac{1}{4}$*s.* + $\frac{1}{8} \times 106$*d.* − $\frac{3}{2} + 175$*f*
$= \frac{441}{16}$*s.* + $13\frac{1}{4}$*d.* − 5*od.*
$= 28$*s.* $10\frac{1}{4}$*d.* + $13\frac{1}{4}$*d.* − 4*s.* 2*d.*
$= £1\ 5s.\ 9\frac{3}{4}$*d.* Ans.

(4) $3\frac{1}{2} : {\cdot}5 :: 1{\cdot}75 : x$
or $3\frac{1}{2} : \frac{1}{2} :: 1\frac{3}{4} : x$
$\therefore \frac{1}{2} \times \frac{7}{4} \times \frac{3}{7} = \frac{3}{4}$. Ans.
The first and second terms of a proportion should be alike. In the example given they are not. The proportion therefore is wrong.

END OF THIRD YEAR.

(*Two hours and a half allowed.*)

Needlework.

GIRLS ONLY.

(*One hour allowed for this exercise.*)

Make a pillow-case ($\frac{1}{4}$ in. scale), completing it as far as time will allow.

Arithmetic.

BOYS ONLY.

(*Answer three questions only, including the last if you can.*)

1. Find the square root of 9980·01.

2. What sum will amount to £819 16*s.* 3*d.* in $5\frac{1}{2}$ years at $4\frac{3}{4}$ per cent. per annum simple interest?

3. What will be the cost of paving a square court-yard whose side is 40 ft. with paving stones 2 ft. 8 in. long and 15 in. wide, each costing 7*s.* 9*d.*?

4. Form a simple rule that shall include all cases of division of decimals. Work by equivalent vulgar fractions the sum ·005 ÷ ·02 = ·25.

(1) 9980·01 (99·9 Ans.
81
189) 1880
1701
1989) 17901
17901

(2) £100 will make $4\frac{3}{4} \times 5\frac{1}{2} = £26\frac{1}{8}$, and will become £$126\frac{1}{8}$
$\therefore £126\frac{1}{8} : £812\frac{1}{2} :: £100 : x$
$\frac{1008}{8} \times \frac{1625}{2} \times \frac{100}{1}$
$= £650$. Ans.

(3) $(40 \times 40) \div (2\frac{3}{4} \times 1\frac{1}{4}) \times 7\frac{3}{4}$s.
$= 1600 \div 10\frac{1}{2} \times 7\frac{3}{4}$
$= 3720$s.
$= £186$. Ans.

(4) Bring both fractions to whole numbers by multiplying by a number containing as many 0's as there are decimal places in the fraction with the greatest number of decimal places and divide as in whole numbers, putting down a decimal point as soon as the divisor will not divide into the dividend.

Example—4·096 ÷ 15·1347. Multiply by 10000 and thus get 40960 ÷ 151347. The latter will not go. Put down a decimal point and bring down 0's.

$$\cdot005 \div \cdot02 = \cdot25.$$
$$\frac{5}{1000} \div \frac{2}{100}$$
$$= \frac{5}{1000} \times \frac{100}{2}$$
$$= \frac{5}{20}$$
$$= \frac{1}{4}$$
$$= \cdot25. \text{ Ans.}$$

Grammar.

BOYS AND GIRLS.

(*Answer three questions only.*)

1. Paraphrase this stanza—
And *forth* they *pass*, with pleasure forward *led*,
Joying to hear the *birds'* sweet harmony
Which therein shrouded from the tempest dread
Seemed in their song to scorn the cruel *sky*.
Much can they *praise* the trees *so straight* and high,
The sailing pine, the cedar proud and tall,
The vine-prop elm, the poplar never dry,
The builder oak, sole king of forests all,
The aspen, good for staves, the cypress funeral.

2. Analyse the first four lines, and parse the words printed in italic.

3. Explain the difference between a common, a proper, and an abstract noun; and give examples. Give six terminations, Latin and English, by which you can distinguish abstract nouns from others.

4. What is the signification of the syllables, *in*, *sub*, *ob*, *un*, *en*, *circum*, *post*, when used as prefixes? Give two examples of each.

5. Correct or justify these sentences :—
I wished to have seen him yesterday.
Almost every house in the place are pensions or hotels.
The phenomena was very curious.
Do not write, except you find it to be needful.
He prefers reading poetry than prose.

(2) (*a*) Principal Sentence.
Connective—And.
Subj.—they.
" *Adjuncts.*—joying to hear the birds' sweet harmony, with pleasure forward led.
Pred.—pass.
Ext. of Pred.—(place) forth.
Adjective to *birds* in P.S.
Subj.—which.
" *Adjuncts*—therein shrouded from the tempest dread.
Pred.—seemed.
Ind. Obj.—to scorn the cruel sky in their song.

(*b*) *Forth*—adv. of place, modifying *pass*.
pass—verb, reg. intrans., act., ind., pres., 3rd plur., agreeing with its nom. *They*.
led—past part. of *to lead*, referring to *they*.
birds'—com. noun, com. gen., plur., poss., gov. by *harmony*.
which—rel. pro., com., plur., 3rd., nom. to *seemed*.
therein—adv. of place, modifying *shrouded*.
seemed—verb, reg., intrans., act., ind., 3rd., plur., agreeing with its nom. *which*.
sky—noun, com., neut., sing., obj., gov. by *to scorn*.
praise—verb, reg., trans., inf., pres., gov. by *can*.
so—adv. of degree, modifying *straight*.
straight—adj. of quality, qualifying *trees*.

(3) A proper noun is the particular name given to a person, place, or thing, to distinguish it from others of the same kind. A common noun is the name given in common to all things of the same class or kind. Thus :—London and Manchester are cities. *Cities* is a common noun, because it is the name given to all places of the same kind as the two named, but *London* and *Manchester* are proper nouns, because they are the particular names by which we distinguish these cities from other cities. An abstract noun denotes a quality or attribute which we regard in our minds as having an independent existence, or the name of an action : thus, whiteness, goodness, writing, are abstract nouns.

Terminations of abstract nouns :—
Latin—age, ance, tion, ty, tude, ence.
English—hood, lock, ship, ness, -th, ledge.

(4) *in*—before an adjective means *not*, as inelegant, indecent.
in—before a verb means *in* or *into*, as induct, include.
sub—under, as subject, subtract.
ob—against, or *in the way of*, as object, obstruct.
un—not, as unhappy, uncover.
en—in, as endear, enhance.
circum—round, or *about*, as circumscribe, circumspect.
post—after, as postpone, postdate.

(5) I wished to see him yesterday.
Almost every house in the place is a pension or an hotel.
The phenomena were very curious.
Do not write unless you find it to be needful.
He prefers reading poetry to prose.

Geography.

BOYS AND GIRLS.

(*Answer three questions only, including the last, if you can.*)

1. Give a description of three of the following :—Siberia, Afghanistan, Mecca, the Red Sea, the Nile, the Sahara.

2. Name the chief mountain systems of Asia, and give a description of one of them.

3. If a ship is sailing from England to Australia round the Cape of Good Hope, how may her course be assisted by ocean currents and by winds?

4. Describe the courses of the Congo and the Indus. What recent attempts at colonization and exploration are connected with the former?

5. Draw a map containing Turkey in Asia, Persia, and Arabia; or a map of the Chinese Empire, showing the principal rivers.

(1) *Siberia.*—A vast territory, covering 4,700,000 sq. miles, in the north of Asia; watered by the rivers Obi, Irtish, and Yenisei, flowing into the Arctic Ocean, and the Amoor into the Pacific. Is a great plain, inclined slightly towards the Arctic, and consists largely in winter of frozen plains, and in summer, near the rivers, of immense swamps. The south has large forests of pine, larch, and birch. The country is rich in gold, silver, copper, platinum, tin, zinc, and other minerals.

Afghanistan lies south of Turkestan, west of India, north of Beloochistan, and east of Persia. Its surface is a succession of high valleys and table lands, varying in elevation from 3,000 to 5,000 feet, situated on the declivities of the Hudu Koosh and the Soliman Mountains. Towards the west it is more flat, and here is found the Desert of Seistan. Between India and Afghanistan are many passes, the best known being the Khyber and the Koord Kabul. Kabul, Herat, Kandahar, and Jellalabad, are the chief towns. Many of the people are wandering tribes ruled by chiefs called Khans.

Mecca, the capital of the province Hedjaz, in Arabia, situated in a narrow valley on the Red Sea, 51 miles from Jiddah. It was the birth-place of Mahomet in 569, and is venerated by Mussulmans as a Holy City. It contains a spacious temple, in the centre of which is the shrine of the Prophet. Many thousands of pilgrims visit it every year. The population of the town is 45,000.

(2) The chief mountain systems of Asia may be said to centre round or radiate from the Bolor Tagh mountains, running north and south between Chinese and Independent Turkestan. The great chain stands on the lofty plateau of Pamir, and attains an elevation of 19,000 feet.

The western system forms the northern boundary of the table lands of western Asia. The chief parts of the system are the Hindoo Koosh, the Paropamisus, Elburz and Kurdistan Mountains, the Taurus, Anti-Taurus, and Lebanon Mountains, and the Caucasus, which mark the limits of Asia.

The south-eastern system includes the Himalayas (Mount Everest, 29,000 feet), the Karakorum Mountains, the mountains of Aracan, Siam, Cambodia, and Anam. The Vindhya and East and West Ghauts branch southwards into the Indian Peninsula.

The eastern system includes the Kuen Lun Mountains and the Pi Ling Mountains.

The north-eastern system embraces the Thian Shan Mountains, the Altai, and the Yablonoi ranges.

(3) After crossing the Bay of Biscay she would be assisted by the return current which helps to form the Sargasso Sea. In a short time after she would get into the region of the trade winds, and keepnig close to the coast would have the advantage of the Guinea current. Along the west coast of Southern Africa she would be impeded by the Equatorial and the South-East Trades, but keeping well south of the Cape of Good Hope would get into the Equatorial counter-current of the Indian Ocean, an advantage she would continue to receive to the coast of Australia.

(4) The Indus rises in Thibet on the northern side of the Himalayas, and flows in a north-west direction through the valley of Cashmere till it reaches the eastern portion of the Hindoo Koosh. It then turns south-west and flows in that direction parallel with the Soliman Mountains till it reaches the Arabian Sea, into which it empties itself by seven mouths.

Near its bend, 250 miles from its source, it is joined by the Shyook, and after piercing the Himalayas by the Cabul, near Attok. It afterwards receives the united waters of the five rivers of the Punjab, Jhelun, Chenab, Ravee, Beaz, and Sutlej. Its whole course is about 950 miles.

The Congo is a great river of west Equatorial Africa. It begins in Lake Bangweolo and flows north-west, and then flows south-west into the Atlantic. It is known first as the Luapula, then as the Lualaba, and afterwards as the Zaire, or Congo. Its whole course is estimated at 2,900 miles, and it receives many tributaries, the greatest being the Ikelembo. Its course is broken by two main cataracts, or falls, the lower being known as the Yellala Falls.

Mr. H. M. Stanley travelled its whole course, and gives a good account of the fertility of the immense district drained by it, which has since been formed into the Congo Free State, with the King of Belgium at the head.

History.

BOYS AND GIRLS.

(*Answer three questions only.*)

1. Mention in chronological order, with dates, *ten* of the most memorable events in the reign of George III.

2. Say what you know about Walpole, the elder Pitt, and Sir Robert Peel.

3. Say where these places are and what happened at them:—Edge Hill, Worcester, Dunkirk, La Hogue, Culloden, and Corunna.

4. Mention the chief events in connection with the Seven Years' War.

5. Name some of the great improvements in manufactures in the reign of Queen Victoria.

(1) Treaty of Paris, 1763.
Prosecution of John Wilkes, 1763.
War of American Independence, 1775—1783.
Treaty of Versailles, 1782.
Wars with France, 1793—1803, and 1803—1815.
Capture of the Cape, 1795.
Lord Edward Fitzgerald's Rebellion (Vinegar Hill), 1798.
Union of Great Britain and Ireland, 1801.
Treaties of Paris, 1814 and 1815.
Treaty of Ghent, 1814.
Battle of Waterloo, 1815.

(2) Sir Robert Walpole lived from 1676 to 1745. He was Secretary for War in the reign of Queen Anne, but did not rise to great power in the country till the South Sea scheme came to a climax in 1721. He then formed a scheme for lessening the great calamities which the bursting of the bubble caused and became Chancellor of the Exchequer, and afterwards Prime Minister. For a time he succeeded in avoiding war with Spain, but was afterwards driven into it in 1742, after having maintained peace and his own power for nearly twenty years. The attacks on his administration drove him from power and he retired as Earl of Oxford.

William Pitt, Earl of Chatham, the 'great commoner,' entered the House of Commons in 1735 and became troublesome to Walpole. He hated bribery, by means of which Walpole had maintained his power. In 1756 he became Secretary of State and was the most prominent Statesman in England during the Seven Years' War. He objected strongly to the taxes on the American Colonies which led to the War of Independence, and died shortly after a great speech against it in 1778.

Sir Robert Peel, 1788—1850, commenced public life as an opponent of reform, but gradually changed his opinions and while in office succeeded in passing bills for Catholic emancipation, repeal of the Corn Laws, many reforms in taxation, the forming of a police force. He first imposed the Income Tax. Was premier in 1834—5 and 1841—6.

(3) *Edge Hill*, in Warwickshire, first battle in the Civil War, October 23rd, 1642.

Worcester, county town of Worcestershire, on the Severn. In 1651 Cromwell defeated Prince Charles who had been crowned in Scotland, and had then marched into England. Prince Charles escaped to France.

Dunkirk, a strong seaport of France, north-east of Calais. Taken by the Allies in 1658. Sold to France by Charles II. for £500,000.

La Hague, a cape at the north-west of the peninsula of Manche, in the English channel. Defeat of the French off the cape in 1692.

Culloden, a bleak moor east of Inverness. Duke of Cumberland defeated the Young Pretender here in 1746.

Corunna, a seaport of Galicia, in Spain. Sir John Moore killed here after defeating Marshal Soult in 1809.

(4) In 1756 Admiral Byng was shot for failing to relieve Minorca.

In 1757 Clive gained the battle of Plassey.

In 1759 Wolfe gained Quebec, and the battle of Minden was won in Germany, while Admiral Hawke destroyed the French fleet off Brest.

In 1763 Spain lost Havannah, and the French most of the West India islands.

The Treaty of Paris ended the war.

(5) Machines driven by steam or water power have almost entirely taken the place of those worked by hand, and the work is now done in large factories by rapid processes instead of the slow, laborious methods of former years. Cotton, woollen, silk, and linen fabrics are now all made in this way. Great improvements in the machinery have been made from time to time, so that fabrics of every colour and of every degree of fineness can be made by machinery. Carpets, shawls, lace, and hosiery, are instances of this improvement. The manufacture of boots and shoes by machinery, and the invention of the sewing machine, have assisted in providing cheaper articles of clothing.

The process of manufacturing steel has been invented and has led to great improvements in articles made of that metal, to a revolution in the building of ships, and to greatly increased facilities for travelling, while the improvements in the manufacture of type and books has led to a much greater use of the improved and cheapened article. Improvements in the manufacture of agricultural implements, as sowing, reaping, ploughing and thrashing machines, have led to cheapened food and more varied and increased production of vegetable products.

Teaching.

BOYS AND GIRLS.

(*Answer two questions only.*)

1. Make notes for a collective lesson on one of these subjects:—
   (*a*) A river (for Standard II.).
   (*b*) The colour blue (for Infants).
   (*c*) Adverbial sentences (first lesson).

2. Explain how you would make young children familiar with the right use of the figures 17 as the notation for seventeen.

3. Explain, as to a class, the meaning of the word 'Tense' in Grammar, and give an outline of a first lesson on the Tenses.

4. Draw a plan of some school-room with which you are familiar, and give its dimensions and those of the desks and chief articles of furniture. Say of what use such a plan is to young children.

(1) (*a*) *A River.*—(For Standard II.)

[The method of introducing a lesson of this kind will vary with the locality, according as it is hilly or flat, far or near from a river. In a flat district there is much more need for vivid description than in the former.]

Introduction.—Refer to a rainy day: clouds black, heavy, pouring rain on everything around. What becomes of it all? Then follow it from the roof, down the spouts, into the road or street, *always finding its way to a lower level*, till it reaches a hollow (lake) or a stream.

Next notice similarity between roof of house and mountains. What does the roof do to the water? So do mountains. Act as *Watershed* or *Waterparting*. (Write on B.B., and see that word is well understood.)

Beginning of a River.—Now follow water which falls on one side of the hill. Some sinks into the ground. All cannot. Drops join and form little threads of water. These unite and form a *streamlet*. This beginning of the river is called its *source*. (Write on B.)

Basin.—Next show how land is usually in ridges and hollows (hills and valleys); the high land often enclosing a great hollow like a *basin*. (Draw attention to natural features of locality if of this kind, or use sand model or other model.) Water from all the hills runs down the sides. Streams join and form the river. The whole land drained is the basin.

Parts of a river. Take next the names given to various parts of river. Streams make the river grow—called *Feeders* (use this name only at first and not Tributaries). The place where the water lies—*bed*. The land on either side—*banks*. Names of banks—*right* and *left*: Why? distinguish between them. Place where water is discharged—*mouth*. Show various kinds on map. Make sketch on blackboard; also use sand model. Question on whole. Bring children out to point on sketch map, or on sand map, and to make on board or sand model.

(2) First get them to know the meaning of *ten*. Put ten marbles in a bag and call it *one* ten. Put seven loose marbles by its side, and say one ten and seven. Then show that a ten is more than a seven and the biggest is put first. But it is easier to say seventeen (or seven and a ten) than to say one ten and seven. So we shorten the words by saying seventeen. Practise with the bag and other loose numbers, and have the value put upon the board till the form is perfectly familiar.

(3) *Tense* is the form of the verb used to denote time. The form of the verb undergoes a change whenever we wish to represent an action as taking place at different periods of time.

First Lesson on Tense.

Write three short sentences on B.B., as—

(*a*) John sings.

(*b*) John sang.

(*c*) John will sing.

By questions elicit the fact that these three sentences denote the same action occurring at three different times. (*a*) refers to time *present*, (*b*) to time *past*, (*c*) to time to come or *future* time.

Next draw attention to the form of the verb in these sentences, and ask for the difference. In (2) the vowel is changed. In (3) *will* is prefixed. So that each is different from the other.

∴ To denote a change of time we have a change of form. Then write *definition* (as at the beginning of this answer).

Now give other verbs of a similar kind, and let the past and future tenses of these be given.

Next give some regular verbs and show how the *past* is formed.

Have a written exercise performed.

(4) [In answering this question each pupil teacher would probably take his own school. The latter part of the question might be answered as follows]:—

The uses of plans to young children are various. By their means they may be taught some idea of proportion and scale. Their powers of observation are brought into play, and they learn to take particular notice of the forms, sizes, and places of different objects. Their first ideas of maps may be gained from plans, and when taught to draw them, the power of imitation is also brought into operation.

END OF FOURTH YEAR.

(Three hours and a half allowed.)

Euclid.

BOYS ONLY.

[All generally understood abbreviations and symbols for *words* may be used, but not symbols of *operation*, such as −, +, ×.]

(Answer two questions, including No. 3, if you can do so.)

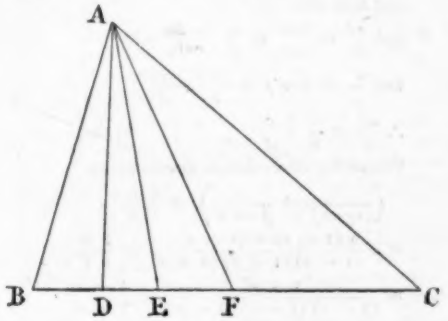
1. If a straight line be divided into two equal parts, and also into two unequal parts, the rectangle contained by the unequal parts, together with the square on the line between the points of section, is equal to the square on half the line.

Euclid: Book II., Proposition 5.

2. To divide a given straight line into two parts, so that the rectangle contained by the whole and one of the parts may be equal to the square on the other part.

Euclid: Book II., Proposition 11.

3. AD is perpendicular to BC the base of the acute-angled triangle ABC. AE bisects the angle A. Show that the difference of the angles at B and C is equal to twice the angle DAE.



(3)

At A in EA make ∠ EAF = ∠ EAD.

By I. 32 ∠ ADC, *i.e.*, ∠ ADB = ∠'s DBA, BAD.

It also equals ∠'s DAC, ACD, *i.e.*, ∠'s DAE, EAF, FAC, ACD. And ∠ DAF = twice ∠ DAE, because ∠ DAE = ∠ EAF.

∴ ∠ ADB = twice ∠ DAE, ∠ FAC, and ∠ ACD.

∴ ∠'s DBA, BAD = twice ∠ DAE and the ∠'s FAC, ACD.

But ∠ BAD = ∠ FAC.

For the whole ∠ BAE = whole ∠ EAC (Hyp.), of which the parts DAE, EAF (Constr.) are equal.

∴ remainder DAB = remainder FAC.

Take away the equal angles BAD and FAC.

Then ∠ DBA = twice ∠ DAE and ∠ ACD.

i.e., ∠ at B is greater than ∠ at C by twice ∠ DAE.

Q. E. D.

Algebra.

BOYS ONLY.

(Answer three questions, including questions 1 and 4, if you can do so.)

1. Prove that $(a^2 + bc)^2 + (b^2 + ac)^2 + (c^2 + ab)^2 - (ab + ac + bc)^2 = a^4 + b^4 + c^4$.

Also verify the equality when $a = 2$, $b = -3$, $c = -4$.

2. Find the L.C.M. of $2x^2 - 7xy + 6y^2$; $4x^2 - 8xy + 3y^2$; $2x^2 - 5xy + 2y^2$.

3. Prove that $\frac{a}{b} + \frac{c}{d} = \frac{ad}{bc}$, where the letters denote any numbers.

Simplify $\left(\frac{x}{(1-x)^2} + \frac{1}{1-x^2}\right) + \frac{1+x^2}{1+x}$.

4. Solve the equations—

(*a*) $\begin{cases} 7x - 8y + 22 = 0. \\ 11x - 10y - 4 = 0. \end{cases}$

(*b*) $21x^2 - 36 = x$.

(1) $(a^2 + bc)^2 = a^4 + 2a^2bc + b^2c^2$
$(b^2 + ac)^2 = b^4 + 2ab^2c + a^2c^2$
$(c^2 + ab)^2 = c^4 + 2abc^2 + a^2b^2$

Subtract
$(ab + ac + bc)^2 = a^2b^2 + a^2c^2 + b^2c^2 + 2a^2bc + 2ab^2c + 2abc^2$
Diff. $= a^4 + b^4 + c^4$.

$[2^2 + (-3.-4)]^2 = (4 + 12)^2 = 256$
$[-3^2 + (2.-4)]^2 = (9 - 8)^2 = 1$
$[-4^2 + (2.-3)]^2 = (16 - 6)^2 = 100$
357
$-[(2.-3) + (2.-4) + (-3.-4)] = 4$
$[(2^4) + (-3^4) + (-4)^4] = 353$

(2) $2x^2 - 7xy + 6y^2$; $4x^2 - 8xy + 3y^2$; $2x^2 - 5xy + 2y^2$
$(x - 2y)(2x - 3y)$; $(2x - 3y)(2x - y)$: $(x - 2y)(2x - y)$
L.C.M. $= (x - 2y)(2x - 3y)(2x - y)$. Ans.

(3) Let $\frac{a}{b} = x$ and $\frac{c}{d} = y$.

Then $a = bx$ and $c = dy$.
Hence $ad = bdx$
and $bc = bdy$
and $\frac{ad}{bc} = \frac{bdx}{bdy} = \frac{x}{y}$

But $\frac{x}{y} = x \div y = \frac{a}{b} \div \frac{c}{d}$

$\therefore \frac{ad}{bc} = \frac{a}{b} \div \frac{c}{d}$

Where the letters denote any numbers.

$$\left(\frac{x}{(1-x)^2} + \frac{1}{1-x^2}\right) \div \frac{1+x^2}{1+x}$$
$$= \frac{x(1+x) + (1-x)}{(1-x)(1-x)(1+x)} \times \frac{1+x}{1+x^2}$$
$$= \frac{1+x^2}{(1-x)(1-x)(1+x)} \times \frac{1+x}{1+x^2}$$
$$= \frac{1}{(1-x)^2}$$

(4) (a) $7x - 8y + 22 = 0$
$11x - 10y - 4 = 0$
$77x - 88y = -242$
$77x - 70y = 28$
$-18y = -270$
$y = 15$
$7x - 120 = -22$
$7x = 98$
$x = 14$
$x = 14$; $y = 15$. Ans.

(b) $21x^2 - 36 = x$
$21x^2 - x = 36$
$x^2 - \frac{x}{21} = 1\frac{5}{7}$
$x^2 - \frac{x}{21} + (\frac{1}{42})^2 = 1\frac{5}{7} + \frac{1}{1764}$ or $\frac{1201}{1764}$
$x - \frac{1}{42} = \pm \frac{41}{42}$
$x = \pm \frac{41}{42} + \frac{1}{42}$
$= \frac{42}{42} = 1$. Ans.
$= -\frac{40}{42} = -\frac{20}{21}$. Ans.

Mensuration.

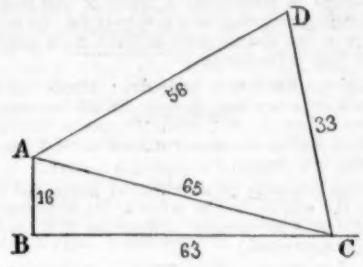
BOYS ONLY.

(Answer one question only.)

1. The sides of a quadrilateral ABCD are AB = 16, BC = 63, CD = 33, DA = 56; the angle ABC is a right angle. Find the area.

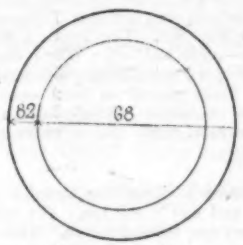
2. Find the area of a circular ring whose inner and outer diameters are 68 and 82. ($\pi = \frac{22}{7}$).

(1)



$63 \times 8 = 504$, area of ABC.
$\sqrt{(63^2 + 16^2)} = \sqrt{4225} = 65$ AC.
$\frac{65 + 56 + 33}{2} = 77$
$\sqrt{77(77 - 65)(77 - 56)(77 - 33)}$
$= \sqrt{853776}$
$= 924$, area of ADC.
$924 + 504 = 1428$, area of ABCD.

(2)



$\frac{22}{7}(41 + 34)(41 - 34)$
$= 1650$. Ans.

Arithmetic.

GIRLS ONLY.

(Answer three questions only, including the last, if you can.)

1. Find the income produced by investing £1,995 in $2\frac{3}{4}$ per cent. Stock at $99\frac{3}{4}$. [Neglect brokerage.]

2. At what rate per cent. per annum, simple interest, will £820 amount to £894 6s. 3d. in $2\frac{1}{2}$ years?

3. 70 men pay into a sick club: 17 pay 1s. 6d. per week, 25 pay 1s. 9d., 20 pay 2s. 1d., and the remainder pay among them per week on the average £1 9s. 1d. Find the average weekly payment per man?

4. A sum of £89 12s. 1d. is divided among three persons in the ratio $1\frac{1}{2}$, $2\frac{1}{4}$, $3\frac{1}{3}$. Find each person's share.

(1) Income $= \frac{£1995 \times 2\frac{3}{4}}{99\frac{3}{4}}$
$= \frac{1995}{1} \times \frac{11}{4} \times \frac{4}{399}$
$= £55$. Ans.

(2) Interest = £894 6s. 3d. − £820 = £74 6s. 3d.
∴ Rate =
£ £
£820 : 100 :: $74\frac{5}{16}$: x
$2\frac{1}{2}$: 1
$= \frac{2}{5} \times \frac{16}{1185} \times \frac{100}{1} \times \frac{1181}{16}$
$= 3\frac{1}{5}$. Ans.

(3)

	s.	d.
17 at 1s. 6d.	= 25	6
25 at 1s. 9d.	= 43	9
20 at 2s. 1d.	= 41	8
8	= 29	1
70 pay	140	0

∴ 1 pays 2 shillings. Ans.

(4) $1\frac{1}{2} + 2\frac{1}{4} + 3\frac{1}{8} = 7\frac{1}{8}$

$7\frac{1}{8} : 1\frac{1}{2} :: £89\ 12s.\ 1d. : £18\ 19s.\ 6d.$ Ans.

$7\frac{1}{8} : 2\frac{1}{4} :: £89\ 12s.\ 1d. : £28\ 9s.\ 3d.$,,

$7\frac{1}{8} : 3\frac{1}{8} :: £89\ 12s.\ 1d. : £42\ 3s.\ 4d.$,,

(*Two hours and a half allowed.*)

Needlework.

GIRLS ONLY.

(*One hour allowed for this exercise.*)

Darn on linen a cross-cut ($\frac{3}{4}$ of an inch in length).

Arithmetic.

BOYS ONLY.

(*Answer three questions only, including the last, if you can.*)

1. Find the cube root of 177,504,328.

2. A school was open 210 days in the course of a year; on 20 stormy days the attendance was small, on 3 of these days ·25 of the scholars were absent, on 5 days ·35, on 8 days ·4, on 4 days ·45: find the average daily absence for the year, supposing that the average absence for the remainder of the days was ·2.

3. A square whose side is $16\frac{1}{2}$ feet, is covered with metal $1\frac{1}{2}$ inches thick; find the cost of the work, if it costs £3 4s. to cover an area 13 feet broad and 52 feet long with metal $2\frac{1}{2}$ inches thick.

4. A metal expands by ·17 of its bulk, when heated between two given temperatures; find to 3 places of decimals by how much of its bulk it contracts when cooled between the same temperatures.

(1)

177,504,328(562. Ans.

$5^3 = 125$ | 52504

$5^2 \times 300 = 7500$

$5 \times 30 \times 6 = 900$

$6^2 = 36$

8436 | 50616

$56^2 \times 300 = 940800$ | 1888328

$56 \times 30 \times 2 = 3360$

$2^2 = 4$

944164 | 1888328

(2)

3 at ·25 = ·75

5 at ·35 = 1·75

8 at ·4 = 3·2

4 at ·45 = 1·8

190 at ·2 = 38·0

210 = 45·50

$\therefore 1 = \frac{45·50}{210} = ·216$ Ans.

(3)

		s.
Length 52	: $16\frac{1}{2}$ ::	64 : x
Breadth 13	: $16\frac{1}{2}$	
Thickness $2\frac{1}{2}$	: $1\frac{1}{2}$	

$x = \frac{64}{1} \times \frac{64}{4} \times \frac{64}{4} \times \frac{2}{5} \times \frac{1}{5} \times \frac{1}{13} \times \frac{1}{64} = 15s.$ Ans.

(4) 1·17 : 1 :: ·17 : ·145. Ans.

Grammar.

BOYS AND GIRLS.

(*Answer questions 2 and 4, and one other question.*)

1 Analyze this passage:—

I *would* the great *world* grew like *thee*,
Who grewest not *alone* in power
And knowledge, but from hour to hour
In reverence and in charity.

2. Parse the words printed in italics in the previous question.

3. Take the words *Indestructibility*; *Re-admission*; and show the meaning and force of each syllable contained in them.

4. Give in your own words the substance of the following passage—

King Richard.

Barkloughly Castle, call they this at hand?

Aumerle.

Yea, my lord. How brooks your grace the air,
After your late tossing on the breaking seas?

King Richard.

Needs must I like it well. I weep for joy
To stand upon my kingdom once again.
Dear earth, I do salute thee with my hand,
Though rebels wound thee with their horses' hoofs:
As a long parted mother with her child
Plays fondly with her tears and smiles in meeting;
So weeping, smiling, greet I thee, my earth,
And do thee favours with my royal hands.
Feed not thy sovereign's foe, my gentle earth,
Nor with thy sweets comfort his ravenous sense.
* * * * *
Yield stinging nettles to mine enemies:
And when they from thy bosom pluck a flower,
Guard it, I pray thee, with a lurking adder,
Whose double tongue may with a mortal touch
Throw death upon thy sovereign's enemies.

5. Select from the above passage eight words which you know to be of foreign origin, and give their derivations.

6. Mention the chief writers of the age of Queen Anne, and give the names of their principal works.

(1) (*a*) Princ. sentence.
Subj.—I.
Pred.—would.
(*b*) Noun sentence.
Subj —The great world.
Pred.—grew.
Ext. of Pred.—like thee.
(*c*) Adj. sentence to *b*.
Subj.—who.
Pred.—grewest.
Ind. Obj.—in power and knowledge.
Ext. of Pred.—not alone.
(*d*) Adj. sentence to *b*.
Connective—but.
Subj.—[who].
Pred.—[grewest].
Ind. Obj.—in reverence and in charity.
Ext. of Pred.—(time) from hour to hour.

(2) *Would*— = wish. Verb, irreg., trans., act., ind., past., 1st sing., agreeing with its nom. *I*.
world—noun, com., collective, com., sing., nom. to *grew*.
thee—pronoun, pers., 2nd., sing., com, obj., gov. by *like*.
who—pronoun, rel., 2nd., sing., com., nom. to *grewest*.
grewest—verb, irreg., intrans., act., ind., pres., sing., 2nd., agreeing with its nom. *who*.
alone— = only. Adv. of deg. qualifying *grewest*.

(3) *Indestructibility*.
In—Lat. *in*, not.
de—Lat. *de*, down.
struct—from Lat. *struo*, I build.
i-bil—from Lat. *ible*, adj. termination signifying power.
i-ty—from Lat. *ity*, affix signifying abstract idea.
Whole word: Having the quality of *lastingness*, or that which prevents it from being destroyed.
Re-admission.
Re—from Lat. *re*, back or again.
ad—Lat. to.
mis—from Lat. *mitto*, I send.
sion—Lat. affix signifying state or condition.
Whole word: State of being sent or received in again.

(4) King Richard asked Aumerle whether the building they saw was Berkeley Castle. Aumerle answered that it was, and then asked the king how he enjoyed the land breeze after tossing on the rough sea.

King Richard replied that he liked it well, and expressed himself delighted to be in his own country once more. Then, turning to look at the ground, he accosted it as if it could hear him speak, saying that he greeted it with his hand, although those who opposed him were ploughing it with their war-horses' feet. And just as a mother is so filled with joy after being long parted from her child, that she alternately weeps and smiles, so he in like manner greeted his country again. He then begged the earth neither to yield food nor to give sweet smells to his enemies, but to grow for them only stinging nettles, and when they attempted to pluck from it a flower, to hide within its leaves a venomous reptile which, darting out its forked tongue, should inflict upon them mortal wounds.

(5) *Rebels*—from Lat. *re.*, back or again, and *bellum*, war; those who rebel.
favours—from Lat. *faveo*, I favour.
royal—from Fr. *roi*, a king; Lat. *rex*, a king, or *rego*, I rule.
Sovereign—from Lat. *super*, above, through Fr. *souverain*.
enemies—from Lat. *inimicus; in*, not, *amicus*, a friend.
double—from Fr. L. *duplus, duplex—duo*, two, *plico*, I fold.
Mortal—from Lat. *mors*, death.
comfort—from Lat. *con*, together, *fors, fortis*, strong.

(6) *John Locke*, mental philosopher. Chief work, 'An Essay on the Human Understanding.'
Gilbert Burnet wrote 'History of My own Times,' and 'History of the Reformation of the Church of England.'
Matthew Prior, poet; 'Alma' and verses.
Joseph Addison, essayist; 'Tatler,' and 'Spectator;' drama, 'Cato.'
Richard Steele; 'Tatler,' 'Spectator,' 'Guardian;' 'The Funeral,' 'The Tender Husband.'
Sir Isaac Newton, metaphysician and mathematician; 'Principia.'
Richard Bentley, critic; 'Dissertation on the epistles of Phalaris.'
Nicholas Rowe, dramatist; 'The Fair Penitent.'

Geography.

BOYS AND GIRLS.

(*Answer three questions only, including the fourth and sixth, if you can.*)

1. From the South of Asia project three large peninsulas, which in some respects resemble three on the South of Europe. Thus, on both Continents numerous islands are clustered round the Easternmost peninsula; the Central peninsula in both is cut off from the rest of the land by the highest mountain system in the Continent, and has a large island lying off its South Coast; and finally the Westernmost peninsula in both consists of a broad mass of table land separated from Africa only by a narrow strait. Explain the allusions in the above passage.

2. What are the principal vegetable products of the basins of the Mississippi, the Nile, and the Ganges?

3. Say what you know about *five* of the following places, viz.:—Kyber, Nagasaki, Chicago, Manhattan, Niphon, Herat, Shanghai, Titicaca, Corea, Port Elizabeth, Brooklyn, Kalahari, Quettah, Callao.

4. Explain, with diagrams, why there are two high tides daily; also why it is not high tide everywhere in Europe at the same time; and why the high tide of *to-day* happens about fifty minutes later than the corresponding one of *yesterday*.

5. Explain the terms Morning Stars, Saturn's rings, Jupiter's belts and satellites.

6. Draw a map of South America or of Hindostan.

(1) The three Asian peninsulas are Arabia, India, and Further India; the three English are Spain and Portugal, Italy, and Turkey and Greece. Round Further India are clustered Sumatra, and the other islands of the East Indian Archipelago, and round Turkey and Greece are clustered the Ionian Islands and numerous other islands. In Asia, India is cut off from the rest of the continent by the Himalayas and the Soliman Mountains, and has Ceylon at its southern extremity; and Italy is cut off from the rest of Europe by the Alps the highest mountains in Europe, and has Sicily at its apex. Spain and Portugal in Europe form a great tableland separated from Africa by the Strait of Gibraltar, while Arabia in Asia is of a similar character and is separated from Africa by the Strait of Bab-el-mandeb.

(2) The productions of the Mississippi may almost be said to be the productions of America. The States in its basin produce wheat, oats, rye, rice, sugar, tobacco, cotton, potatoes, sugar, maize, and barley.
The basin of the Nile produces rice, wheat, sugar, cotton, indigo and dates.
The basin of the Ganges produces rice, cereals, banana, pine apple and other fruits, poppy, indigo, tobacco, palms, banyan, teak, bamboos, and cotton.

(3) *Kyber*, an important pass between India and Afghanistan, through the Soliman Mountains, a little S.E. of Peshawar.
Nagasaki, oldest port in Japan.
Chicago, large town in Illinois, south end of Lake Michigan; corn and pork exporting town.
Manhattan, Manhattan Island, in the mouth of the Hudson, 13½ miles long, 1½ miles wide, covered by the City of New York.
Niphon, principal island of Japan.
Herat, fortified town in North of Afghanistan.
Shanghai, port in China, most important commercial city on the coast.
Titicaca, lake, 12,000 feet above the Pacific, in the Andes, near the Equator.
Corea, peninsula in E. of Asia, N. of China, 500 miles long, and 150 miles broad.
Port Elizabeth, port of Cape Colony, on western side of Algoa Bay.
Brooklyn, important city on mainland on Hudson River, opposite New York City, in U. S. America; port and residential quarter; 550,000 inhabitants.
Kalahari, uninhabited waste district in S. Africa, north of Orange River.
Quettah, fort in Beloochistan, occupied by British.
Callao, seaport of Peru; good harbour.

(4) [The candidate would draw the diagram found in every text book, showing the sun, moon and earth in a straight line.]
The moon travels round the earth in a day. As it attracts most the waters on the side of the earth nearest to it, on that side the waters are heaped up as it were, and form a high tide. It attracts the earth itself less, as it must move in a mass, and the waters on the opposite side are left in a heap. Two high tides, on opposite sides of the earth, are thus formed at the same time. As every portion of the earth's surface comes under the influence of the moon every day, every place will thus have two high tides daily.

The tidal wave formed in the great Southern Ocean finds its way up the Atlantic, and first reaches Spain and Portugal, proceeding northwards to the other countries of Europe.

While the moon is travelling the earth is proceeding in its orbit. The moon has therefore not only to travel round the earth, but to proceed along with the earth in its orbit, and it takes a day and fifty minutes for it to appear over the same place on the earth on each succeeding day. As the tide follows the moon it follows that the tide of to-day will be fifty minutes later than the tide of yesterday.

(5) Mercury and Venus, on account of their being inside the orbit of the earth, can never be seen at a great distance from the sun. When they are west of the sun they appear as morning stars.

Saturn, besides having satellites, has three luminous rings round it at a considerable distance from it, parallel to its equator. These are partially transparent, but throw a shadow on the planet, and also receive the shadow of the planet on the side turned from the sun.

Jupiter is always crossed by bands or belts. These belts vary in breadth and situation, and are supposed to be rifts in the gaseous atmosphere which surrounds it, allowing us to see the dark planet beneath.

Jupiter has four moons or satellites which are larger than the moon of the earth. They turn on their axes in the same time that they take to move round Jupiter. The velocity of light has been determined by means of these moons which are frequently eclipsed.

History.

BOYS AND GIRLS.

(*Answer three questions only.*)

1. Give in order the chief events, with dates, of the reign of James I.

2. What is meant by the Test and Corporation Acts, Catholic Emancipation, and the Repeal of the Corn Laws?

3. Write a short account of two of the following: Bolingbroke, Marlborough, Algernon Sidney, and Charles James Fox.

4. What have been the principal changes in the constitution of the House of Commons from the year 1830 to the present time?

5. Name the chief events which happened in England in the years 1715, 1745, 1780, 1797, 1846, and 1870.

(1)	Accession of James I.	1603
	Main Plot	1603
	Hampton Court Conference	1604
	Gunpowder Plot	1605
	Colonization of Virginia	1607
	Authorized Version issued	1611
	Degradation of Sir Edward Coke ...	1616
	Execution of Raleigh	1618
	Spanish Match broken off	1623
	Quarrel with Parliament	1624
	Death of James	1625

(2) By the Test Act (1673) no one could hold office without adjuring transubstantiation, taking the oaths of supremacy and allegiance, and receiving the Sacrament according to the rites of the Church of England.

The Corporation Act (1661) obliged all officers of corporate bodies to take an oath of non-resistance to high authority, and to take the Sacrament according to the rites of the Church of England.

The Catholic Emancipation Bill (1829) enabled Catholics to sit in Parliament and hold offices generally, except those of Regent, Lord Chancellor, and Lord Lieutenant of Ireland.

Repeal of the Corn Laws (1846). Restrictions were placed upon the importation of corn by a sliding scale of duties according to the price of English wheat. This pressed heavily upon the poor, and Sir Robert Peel succeeded in repealing the laws, and in substituting a small fixed duty for the scale then in use.

(3) Bolingbroke was a celebrated statesman of the reign of Queen Anne. He succeeded in accomplishing the disgrace of the Duke of Marlborough, and endeavoured to secure the succession of the Pretender on the death of the Queen. He managed to overthrow the Earl of Oxford, but his schemes were frustrated by the death of the Queen. He then fled to France and took service with the Pretender, but soon fell into disgrace. After receiving a pardon he returned to England, and although his estates were restored to him through Walpole's influence, he began to intrigue against him. He induced the Prince of Wales to rebel against his father. He wrote 'The Patriot King.'

(*b*) The Duke of Marlborough was first employed in intrigues between Charles II. and the French Court. During James's reign he concocted schemes for bringing over the Prince of Orange, and joined him on his landing, and was employed by William in Ireland. On the accession of Queen Anne he was made captain-general of the forces. He fought several campaigns in the Low Countries, and humbled the power of France in four great battles at Blenheim, Ramilies, Oudenarde, and Malplaquet. The strife between the Whigs and Tories, and the imperious conduct of the Duchess, led to his disgrace. He retired from office to Blenheim Park, which had been given to him by the country. He was one of the greatest military commanders this country has ever known.

(4) The Reform Bill of 1832 provided for the disfranchisement of many small boroughs and the better representation of new populous places and of counties. The franchise was extended to the middle classes generally. £10 householders in towns, and tenants paying £50 rental in counties, received the franchise.

In 1867 the second Reform Bill lowered the franchise still further. Household and £10 lodger suffrage in towns, and £12 rateable value suffrage in counties was introduced.

In 1884 the Representation of the People Act extended the household and lodger franchise to the counties, placed the United Kingdom on one basis, and increased the voters about 2½ millions.

In 1885 the Redistribution of Seats Act caused the absorption of a large number of small boroughs into the counties, added their representatives to the large boroughs and populous counties which were nearly all divided into single member constituencies, and created some new boroughs, the membership of the House of Commons being increased from 658 to 670.

(5) 1715.—Riot Act passed; first invasion of the Pretender, rising under the Earl of Mar; defeat of the Earl of Derwentwater at Preston.

1745.—Young Pretender's rebellion.

1780.—No-popery riots led by Lord George Gordon.

1797.—Mutiny at Spithead and the Nore; Bank Restriction Bill passed.

1846.—Repeal of the Corn Laws.

1870.—Passing of the Education Act. Treaty guaranteeing independence of Belgium agreed to.

Teaching.

BOYS AND GIRLS.

(*Answer two questions only.*)

1. Say what are the requirements of the Code under the heads 'English' and 'Geography' for the Third and Fifth Standards.

2. Make out a sketch of a collective lesson on one of these subjects:—

(*a*) A Farmyard.
(*b*) Tides.
(*c*) *For Infants.* The Season of Spring.
(*d*) *For Infants.* The Whale.

3. The Code requires that exercises in Mental Arithmetic 'should not involve large numbers, should deal with concrete as well as abstract quantities, and should be preparatory to the work of the next higher standard.' Give ten varied examples of Mental Arithmetic questions which fulfil these conditions, and which are suitable for the *Fourth* Standard.

4. Show how you would make the distinction between Transitive and Intransitive Verbs understood by scholars in the Fourth Standard, and how far it would help you to require the children to make or find illustrations of their own.

5. Sketch a progressive course of drawing on chequered slates for infants.

6. Explain any system with which you are acquainted for teaching physical exercises to infants.

(1) *Standard III.—English.*—To recite, with intelligence and expression, 60 lines of poetry, and to know their meaning. To point out nouns, verbs, adjectives, adverbs and personal pronouns, and to form simple sentences containing them.

Geography.—Physical and political geography of England, with special knowledge of the district in which the school is situated.

Standard V.—English.—To recite 100 lines from some standard poet, and to explain the words and allusions. To parse and analyse simple sentences, and to know the method of forming English nouns, adjectives, and verbs from each other.

Geography.—Geography of Europe, physical and political. Latitude and longitude. Day and night. The seasons.

In Standard V. maps and diagrams may be required to illustrate the answers given.

(2) (*a*) For the lesson on 'A Farmyard,' the teacher would require a picture of a farmyard, and of some of the things found in it. The lesson would deal with (1) its situation. (2) Its arrangements. (3) Its live contents. Under (1) the teacher would speak of its proximity to the farm house, in the midst of the farm, perhaps sheltered by trees, but certainly near a supply of water of some kind, either stream, or well, or pond. Under (2) of the buildings for horses, cattle, sheep; of the sheds, the ricks, the barns, the pond, the drainage, the place for refuse. Under (3) of the live stock of various kinds, of the implements needed on the farm, of the necessity for cleanliness and order, for the welfare of the stock, and the easy working of the farm.

(*b*) For tides the teacher would need the blackboard and its accessories; a good map illustrating the tides; three globes of varying sizes would also be useful.

The lesson would be introduced by a reference to what is noticed at the seaside, and an enquiry if anyone knew the cause of the phenomenon. A few general observations about *attraction* would then be made, and the principle illustrated. This would then be applied to the sun, moon, and earth. The diagram would be shown, and the relative positions shown on board. An exaggerated drawing of the appearance of the tides would be drawn, showing *two high tides* on opposite sides of the earth at the same time. The moon would be followed, and the daily rotation of the earth shown to account for high tide being fifty minutes later each day. Then attention would be drawn to the fact of there being low tides at the same time as high tides, but in different places; and, lastly, the difference between spring and neap tides would be shown, with the cause. Reference to the value of the continual movement might conclude the lesson.

(*c*) This lesson would be best given to little children in spring, when they would be able to tell what they saw around them without too great an effort of memory.

The teacher would show a plant just bursting into leaf, an early flower (primrose, snowdrop, cowslip, or violet) would call attention to the trees and the grass. Mention would be made

of the passing away of the snow, the lengthening of the day, the warmer air—now no need for muffs, cloaks, great-coats, &c. Gentle rain instead of snow. The warmth and the rain cause the trees to burst into leaf, and the flowers and plants to grow. Lambs are found at play; children also go out for walks. Everything joyous and happy after dreary winter has gone away.

Lesson would be given chiefly to train the faculty of observation.

(*d*.) The above will serve as specimens of sketches of what lessons should be.

3. Standard V. does practice, simple proportion, and bills of parcels and simple fractions. Standard IV., weights and measures and compound rules, money. Mental arithmetic questions should include all these.

On Standard IV. work.

1. How many halfpenny stamps can I get for 3s. 6½d.?
2. What will 1 cwt. of sugar cost at 3d. per lb.?
3. How many times is 3s. 4d. contained in £5?
4. Nine times 2s. 8½d.?

On Standard V. work.

5. What is the third of a shilling; the sixth of a £; the tenth of a ton; the fourth of a mile, in yards?
6. Eight pairs of gloves at 2s. 6d., and 3 at 3s.?
7. If six pairs of slippers cost 15s., how many pairs can be got for 17s. 6d.?
8. Nine men earn 18s. 9d. a day; what will four men earn in three days?
9. Which is the greater, ⅗ or ⅔?
10. What is the difference between ¼ of a yard and ⅛ of a foot?

(4) I should write three or four sentences down on the board contafning only a noun and an intransitive verb, as:—Lions roar. Fishes swim. I should then ask for a number of sentences of a similar character. This would give the children something to do, and would call for the exercise of thought. It would help in keeping up the interest of the class, and prevent idling, as each promiscuously would be given something to do. The practice would be followed in every part of the lesson. Next, I should write such part sentences as these on the board:—Father brought, William broke, and ask what each needed. A ready answer would be given.—what father brought, what William broke. This would lead to a comparison of the verbs,—some making sense alone, others needing a noun to complete the sense. After numerous examples I should give the names, and show how the names explained the thing they were meant for. Then would follow questions asking for sentences with transitive and intransitive verbs.

(5) (*a*) Dotted vertical lines, then chain lines, then whole lines, one side of square, then two sides, then two half sides, then one and a half sides.

(*b*) Same as (*a*), but horizontal lines.

(*c*) Slant lines from corner to corner.

(*d*) Combination of vertical and oblique, then horizontal and oblique, then all three.

(*e*) Combinations of above to make simple figures, as, a see-saw, a balance, a scale.

(*f*) Parallel lines, horizontal, vertical, slant (as for writing guides, and chequered panes).

(*g*) Square, rhombus, oblong, rhomboid, triangle.

(*h*) Design: growth of plants, trees, leaves, flowers.

(*i*) Common objects—hat, cap, bonnet, teapot, cup and saucer, can, flag, spade, fork, key, candlestick, &c.

(6) [This question will admit of various answers. The following relates to musical drill].

Musical drill in our school consists principally of movements of various parts of the body to music after words of command have been given. The following are some of the movements:—

(*a*) Twisting hands outwards and inwards when by sides; same with elbows by sides and forearms stretched out; the same with hands stretched out to sides and level with shoulders; when stretched above the head; when stretched to the front.

(*b*) Using arms like a wheel alternately; bending; hands to chest, elbows by sides; then raised above the head.

(*c*) Hands on shoulders, throw outwards; same on chest, throw forwards.

(*d*) Left foot forward, swing.

Similar exercises to the above are given with other parts of the body, as right foot first, one hand and one foot, both hands and a foot, swinging to right, to left, &c.

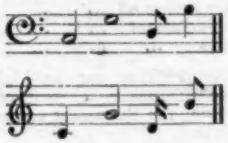
Rings and mazes are also formed, and various movements in marching drill.

END OF FIRST YEAR.

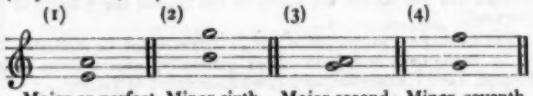
Music.

STAFF NOTATION.

1. Write the following an octave higher on the Treble clef, halving the value of every note:

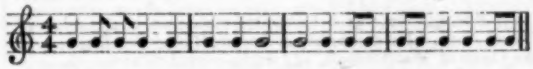


2. Write below each of the following intervals its name (major second, &c.):



Major or perfect fourth. Minor sixth. Major second. Minor seventh.

3. Add bars to the following in accordance with the time signature:



TONIC SOL-FA NOTATION.

1. Write (1) a three-pulse measure, and (2) a four-pulse measure.

(1) | : : | : : ‖

(2) | : | : ‖

2. Write the names of the following intervals:

(1) *soh* to *ray*^{1}. Major or perfect fifth.
(2) *te*$_1$ to *soh*. Minor sixth.
(3) *te* to *ray*^{1}. Minor third.
(4) *fah* to *me*^{1}. Major seventh.

3. Write the following an octave higher, doubling the value of each note:

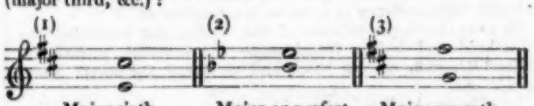
| s_1 : l_1 | t_1 :— | r :s ‖

| s :— | l :— | t :— | :— | r^1 :— | s^1 :— ‖

END OF SECOND YEAR.

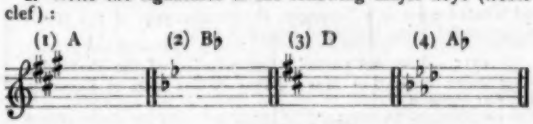
STAFF NOTATION.

1. Write below each of the following intervals its name (major third, &c.):

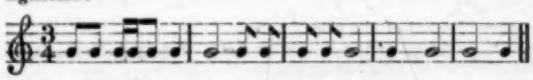


Major sixth. Major or perfect fourth. Major seventh.

2. Write the signatures of the following major keys (treble clef):



3. Add bars to the following in accordance with the time signature:



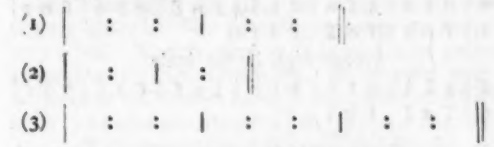
TONIC SOL-FA NOTATION.

1. What is the mental effect of (1) *me*, (2) of *te*, (3) of *soh*?
(1) Tranquil, peaceful. (2) Piercing, expectant. (3) Bold, bright.

2. Write the names of the following intervals :

(1) *ray* to *te*.	Major sixth.
(2) *soh* to *doh*^{1}.	Major or perfect fourth.
(3) *doh* to *me*.	Major third.
(4) *me* to *doh*^{1}.	Minor sixth.

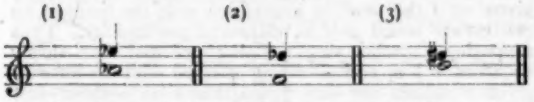
3. Write (1) a six-pulse measure, (2) a four-pulse measure, (3) a nine-pulse measure.

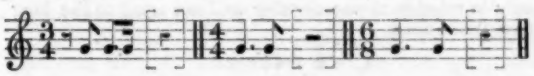


END OF THIRD YEAR.

STAFF NOTATION.

1. Write above (1) a perfect or major fifth, above (2) a minor sixth, above (3) a major third.



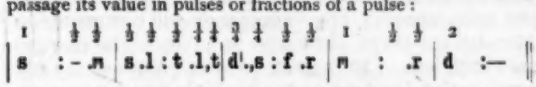
2. Complete each of the following bars by adding one *rest* at the end :

3. State (briefly) the meanings of the following terms :

(1) Ad libitum.	At will or pleasure.
(2) Tempo Primo.	In the original time.
(3) Vivace.	Lively, quick.
(4) Forte.	Loud.

TONIC SOL-FA NOTATION.

1. Write a minor sixth above each of the following notes :
(1) Above *doh—la*. (2) Above *ray—ta*. (3) Above *soh—ma*^{1}.

2. Write (in figures) over each note and rest in the following passage its value in pulses or fractions of a pulse :



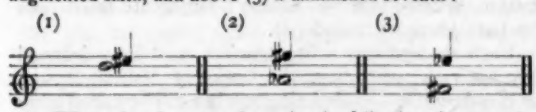
3. State (briefly) the meanings of the following terms :

(1) Ad libitum.	At will or pleasure.
(2) Tempo Primo.	In the original time.
(3) Vivace.	Lively, quick.
(4) Forte.	Loud.

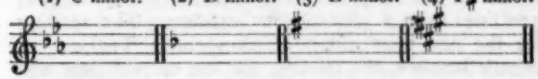
END OF FOURTH YEAR.

STAFF NOTATION.

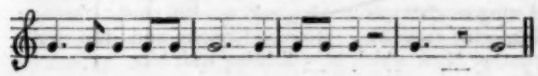
1. Write above (1) an augmented second, above (2) an augmented sixth, and above (3) a diminished seventh :

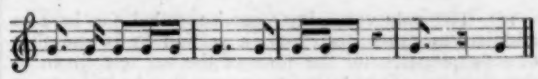


2. What minor keys are shown by the following signatures?
(1) C minor. (2) D minor. (3) E minor. (4) F♯ minor.



3. Re-write the following, halving the value of every note and rest :



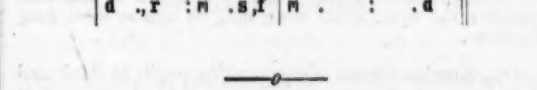


TONIC SOL-FA NOTATION.

1. Write an augmented second above each of the following :
(1) *soh—le*. (2) *doh—re*. (3) *fah—se*.

2. In the minor mode (1) which note is the tonic, (2) which is the dominant, (3) and which is the minor or occasional seventh?
(1) *lah*. (2) *me*. (3) *soh*.

3. Re-write the following, halving the value of each note and rest :



How to Teach School Children to Sing from Notes.

BY W. G. McNAUGHT,
Associate of The Royal Academy of Music.

DIVISION III.—STANDARDS III. AND IV.

CODE REQUIREMENT.

Ear Test.

To imitate to '*laa*,' and afterwards name any three consecutive tones of the scale, which the Examiner may *twice* sing to *laa* (or play), each time first giving the *Doh* chord, or the scale.

Example :—Examiner sings **d m s d^1 s m d**. Then to 'laa' he sings **s f m**. The children then repeat to *laa*, and afterwards give the Sol-fa names.

This test should only be applied to the more advanced children of this division.

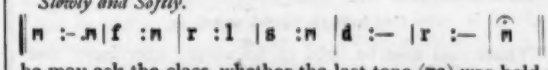
108. Methods of practising ear exercises were fully described in sections 59 to 68. In those sections it was stated that success depends upon the teacher's fluency in giving tests, and that the power of vocalising, *i.e.*, singing to *laa* instead of using the sol-fa names, is intimately associated with the power of telling by ear. Vocalising exercises were described in section 87.

109. Systematic ear training should embrace :—

(1) Demonstrations of mental effects.
(2) Practice of singing modulator voluntaries or unfamiliar exercises to *laa*.
(3) Appeals to the sense of contrast.
(4) Exercises in telling which of two or three announced phrases is sung.
(5) Exercises that the dullest pupils can tell.

110. It is useless to dogmatically state that this or that scale tone has a sad or a bright effect. Pupils must be taught to realise effects. On the other hand, it is unwise to invite descriptions from children unaccustomed to express their sensations precisely and possessing only a limited vocabulary. The best plan is to give a choice of words expressing widely different effects. Thus, supposing the teacher wishes to impress upon the class the calm and tranquility of **me** in such a phrase as—

Slowly and Softly.



he may ask the class whether the last tone (**me**) was bold, cheerful, and bright, or soothing and a little sad.

111. The only vocalising exercise called for here in addition to those described in section 87 is one that directly prepares for the form of the ear test given to this division. The teacher announces that he will require the class to sol-fa and then to vocalise the three tones (in stepwise succession) he now names. The Doh chord is then sung by the class and the three tones are sung to sol-fa names. Then the Doh chord is repeated by the class and the phrase is sung to *laa*. As skill is gained the sol-faing may be dispensed with. But the Doh chord should always be sung not only before every exercise but between the repetitions of the same exercise The tests given below will provide suitable specimens.

112. Observation is greatly aided by appeals to the sense of contrast. The class sings, say, to sol-fa names **s f m** and the teacher (inviting the class to notice what he sings), vocalises either **s l s, s f d, s s s,** and asks whether the same tones were sung by him as were sung by them.

113. Another means of encouraging pupils to think and to believe that they can tell by ear, is to announce that either *this* phrase or *that* phrase will be sung. The pupils then know that one of two things must happen. At first there should be the widest difference between the phrases announced for choice, say for instance **l t d'** and **m r d**. Gradually phrases more like one another should be introduced and the choice may be widened to three or more phrases.

Phrases widely different

l t d' and **m r d**
f m r „ **s l t**
d' t l „ **d r m**

Phrases often confounded

m f s and **r m f**
r m f „ **l t d'**
t l s „ **m r d**
f m r „ **d t_1 l_1**
f s l „ **s l t**

114. The dull pupils should on no account be given up as hopeless. At every lesson some ear tests of great simplicity should be given to encourage such pupils to try to improve. Thus the teacher may ask. Do I sing up or down? How many *dohs* and *sohs* do I sing? Do I sing **d s m** or **d m s**?

115. It is often best to begin an ear telling practice by silencing the best pupils. This can be done on the following plan :—

Whole class to stand. Pupils told to hold up hands if they think they have found the notes of a somewhat difficult test. Of those whose hands are raised one is asked for his answer. If he is right he is told to sit down and not to answer further questions. This process is repeated again and again, each time with a new test. In this way an active teacher can quickly silence the sharpest pupils. For those left standing easier tests are devised until only the residuum prescribed for in section 114 remain.

116. The note appended to the Code requirement states that this test should be applied to only the more advanced children of this division. What proportion of a class should be expected to tell correctly tests of the kind described is a moot point. After many opportunities of testing the work of good teachers of singing in classes of average children, the present writer believes that if 25 per cent. of a class can answer correctly two tests out of three such a result should be considered highly satisfactory.

Graduated Ear Exercises.

These can also be used as vocalising exercises. See Section III. above. At first pupils may be told the name of the first note.

Beginning on **doh**.

d r d | d r m | d r r | d d r | d d t_1 | d t_1 d ||

Beginning on **me**.

m f m | m f s | m r d | m r r | m f f | m r m ||

Beginning on **soh**.

s f m | s l s | s f f | s s f | s l l | s f s | s l t ||

Beginning on **doh'**.

d' t d' | d' t l | d' t t | d' d' t | d' r' d' | d' r' r' ||

Groups low in the scale.

d r m | m f s | s f m | d t_1 l_1 | r m f | m r d | f m r} r d t_1 | r m r | f m f | r d r ||

Groups high in the scale.

l t d' | s l t | d' t l | t l s | l s f | f s l | t d' r'} d' t d' | l s l | l t l ||

Difficult to tell.

m f s | l s f | t l s | r m f | f s l ||

117. It must be ever borne in mind that the tones of an ear test derive their effects entirely from their relation to the Doh chord. If the Doh chord is not properly given, or if the pupil is inattentive to it, the tones of an ear test are heard only in relation to one another. Thus supposing a teacher sings a Doh chord and then slowly vocalises **t l s**, and not being satisfied with the answers given vocalises the test again, this time without first singing the Doh chord. The best pupils will now probably say that the tones are **m r d**. They will hear the tones only in relation to one another and not at all to the long past Doh chord.

(To be continued.)

—o—

The New Syllabus.

MALES.

THE Syllabus for the examination for Certificates has just been issued. The examination will commence on Monday the 9th of December at 3 p.m. The changes are very few. In regard to the grouping a new combination has been formed, which may be any two of the following, one language, one science, economy. As before, all candidates must take (a) and (b) and they may take two other groups, but no more. Acting teachers who have not passed with credit in one of the two immediately preceding years in either or both groups (c) and (d) must take it or them up again. Acting teachers who have not been examined in one of the two immediately preceding years, or having been examined have failed to obtain a certificate must take up both groups (c) and (d).

Each student and acting teacher must have learned 300 lines of poetry from the works of Milton, Byron, or Wordsworth. Each acting teacher will be called upon to repeat some part at the annual inspection of his school for the first year's Certificate, and for the second, 300 lines from a play of Shakespeare. The reading for the first year will be Shakespeare's Tempest or Scott's Ivanhoe, the reading for the second year will be from the Golden Treasury of Songs and Lyrics, Book IV., or from Trench on the Study of Words. Acting teachers as well as students will read before the Inspector from the prescribed books and also from another book which he will bring with him.

Lock's Thoughts concerning Education sections, 140 to 190 inclusive, are set down for study in the second year. The books selected for grammatical study in the first year are Gray's Odes and Elegy, and Bacon's Essays, 1 to 26; and in the second year Shakespeare's Macbeth, Gray's Odes and Elegy. In the succeeding year the books are Shakespeare's King Richard II., Tennyson's Lancelot and Elaine and Bacon's Essays 1, 2, 4, 5, 9, 11, 14—19, 21, 24, 25, 27—32, 36, 38, 39, 50.

The Geography for the first and second year is slightly altered. The general geography of Europe is prescribed. Sketch maps such as would be drawn by a teacher in the illustration of lessons may be required of the British Isles, France, Italy, and Switzerland. The special period of history is from 1685 to 1788. The only change in the Algebra is that for the second year where the word integral is inserted before index. The Binomial Theorem is now only required in the case where the index is a positive integer.

The Latin books for 1889 are, Cæsar's Gallic War, Book III., Virgil, Æneid, Book I. The Greek books are Xenophon, Cyropædia, Book V., Homer, Iliad, Book VI.

The French Books for 1889 are, Souvestre's Un Philosophe sous les toits, Racine's Iphigenie, and the German books, Grimm, Kinder und Hausmärchen, and Schiller, Wallenstein (first part). In 1890 the French passages will be taken from George Sand, La Mare au Diable, Molière, Le Misanthrope, and the German passages from Goethe, Götz von Berlichingen, and Schiller, Die Jungfrau von Orleans.

The regulations for the examination of Science in Training Colleges have been entirely remodelled during the past year. The subjects which can be studied are the same and the curriculum is not altered except in the case of Mathematics. The main difference between the old regulations and the new is in the fact that whatever subject is taken it must be continued over the two years of residence as no one will be allowed to attempt the paper for the advanced stage unless he has been previously successful either at the May examination or at the Training College in the elementary stage of the subject. Male candidates are restricted to two subjects and female candidates to one, as previously. The detailed Syllabus for the Sciences will be found in the Science and Art Directory.

FEMALES.

THE Syllabus for Female teachers for 1889 contains but few alterations. In regard to reading and repetition from memory it will be necessary in future for each acting teacher to have learned 300 lines from the works of Milton, Byron, or Wordsworth, which she will be called upon to repeat upon the annual inspection of her school. The students of the first year, and acting teachers taking first year's papers, will be expected to read passages from the Tempest, or Charles Lamb's Essays of Elia; the students of the second year, and acting teachers taking second year's papers, from the Golden Treasury of Lyrics, Bk. IV., or from Scott's Woodstock. Under the head of School Management, for the first year, the following words are added: 'The methods and principles of infant teaching and discipline,' Art. 109 (e) and (f). For the second year Pestallozzi has been replaced by Locke's 'Thoughts concerning Education,' sections 140 to 190 inclusive.

The parsing and analysis of passages from Byron's 'Childe Harold,' Canto III., and Macaulay's 'Essay on Moore's Life of Byron' in the first year, and the analysis, grammar, and paraphrase of passages from Shakespeare's Macbeth. The language, style and allusions in Macbeth, and Bacon's Esaays, 1—26. There is no change in regard to the Arithmetic, the Domestic Economy, or the Vocal Music. The special books prescribed for German, French, Greek, and Latin are the same as those for the Male candidates.

—o—

Science Notes.

THE reports of the examiners on the results of the Science Examinations held in April, May, and June, 1888, by the Science and Art Department, have just been issued. It is a pamphlet of 52 pages, and contains criticisms on the answers to 15 of the subjects. These reports are of importance to the teachers, and will certainly be carefully studied by them. There are, however, some points of more general interest, and to a few of these we draw attention.

It is pleasing to note that there has been a large increase in the number of those taking stages I., II., and III. of Mathematics, though the effect of it seems to be a falling-off in the percentage of passes. We hope there was no attempt to raise the standard on account of the number presenting themselves. The examiners say the papers are as good as they were the year before last, and better than they were four years ago. Improvement is still desirable, particularly in the way of neatness and accuracy.

The examiner on the subject of Applied Mechanics and Steam reports that the results were, on the whole, satisfactory. He then prints about 17 of the questions set, and makes remarks upon the answers. The criticisms, however, rarely amount to more than: 'This was badly answered, except in a few instances.' 'Some excellent answers to this question.' Now, if it is worth while printing a question six or seven lines long, it is surely worth while saying something about it which will be useful and instructive to the teacher or the student, or both. The teacher will never object to being shown what may be of service to him. What we want to know is not that many answers were bad and many good, but why they were good and how the bad ones could have been made better.

The report on the examination in Physics is short but to the point. Bad text books, books in which there are mistakes which the pupils have not the ability to detect, but which they believe and reproduce, are at the bottom of much of the mischief. The same thing is true in other branches. The examiner in Geology says that some of the candidates still call corals insects.

The report upon the examination in Physiology and Biology is as detailed and precise as on former occasions. Complaint is made that the teaching is often loose, general, and indefinite, and lacks precision. One is sorry to hear that of the 29 who took the honours paper only three were summoned to the practical exercise, and all three were rejected. Considering that in other subjects excellent papers were

done in honours, and seeing no reason why men taking up Physiology should be specially dull or incapable, one is almost driven to the conclusion that the requirements for a pass in honours in Physiology are beyond what can be fairly expected under the circumstances, and beyond what does actually satisfy the examiners in other subjects. A high standard should, no doubt, be insisted on; but to insist upon too much is to discourage the study of the subject. Men will, if they are wise, cease striving after the unattainable. Could not the examiners say more precisely what they want for a pass in Honours, and how it can be acquired. Our object is not to find fault. The criticism of the answers in Elementary and Advanced Physiology is most admirable. No pains have been spared to help the teachers to teach better and the pupils to answer better.

The most useful suggestion is given to the candidates for honours in Botany. It is said that the majority of the failures were due to the unsatisfactory descriptions given of the specimens; that several of the rejected candidates would have passed if they had shown any ability in observing and describing the specimens, and referring them to their natural orders.

The criticisms upon the answers to the questions in Agriculture are exceedingly good. We should recommend all who intend to take this subject next year to study them carefully. It is very gratifying to read the following:—'In our present examination for honours we have 57 papers, which for breadth of accurate knowledge of agriculture cannot be equalled in any agricultural examination either in this kingdom or in the colonies. I heartily congratulate the Department upon the eminent success which has attended the work of their widely-spread body of teachers, and I feel that, as a simple act of justice to them, the excellence of their work should be clearly recognised without hesitation or reserve.'

These remarks are written by one who is actually acquainted with the facts. They may be taken as an answer to some of the unworthy aspersions sometimes indulged in by unfriendly critics of the work done in the science classes in connection with the Science and Art Department.

***

AT the last meeting of the Statistical Society Mr. Giffen read a paper in which he dealt with changes in prices and incomes. He pointed out that between 1850 and 1873 both commodities and money increased in about the same degree. After the latter date commodities went on increasing as before, while there was a check to the increase of money. This has lead to an increase in the purchasing power of the sovereign. More work has to be done by it; it commands more in exchange. Hence a general fall in prices. This appreciation of gold becomes a serious thing for those persons or countries who have debts to pay. They have to supply more commodities than before for the same money. They benefit, it is true, by lower interest, but the balance of advantage is against them. Where debts increased much more rapidly than population, as in France and some Australian colonies, and the Argentine Republic, the effects of the appreciation of gold may become the cause of serious trouble. As to the future, we may expect a moderate appreciation to continue. To prevent it, or even to check it, there must be an enormous development of gold mining. But everything that economises gold currency tends in the same direction. The issue of one pound notes is surely only a question of time. The objections to them are unscientific and baseless. The impossibility of an unvarying standard of value suggests the idea of giving options in the case of sums to be paid at distant dates. Instead of binding himself to pay £100 in 1938, a merchant might bargain to have the right to substitute a certain quantity of other commodities. Many mischiefs might have been avoided if all concerned had realised, ten or fifteen years ago, what was likely to happen in money, and good will be done now if the future possibilities are steadily kept in view.

Query Column.

RULES.

1. Each correspondent is restricted to *one question*. We should be much obliged if correspondents, who send questions for solution, would give (if possible) the required answer, and the source from which the question is obtained.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. ☞ When a pseudonym is adopted it should be written at the end of the query, and the real name and address on a separate piece of paper.

4. Correspondents are requested to write their queries *legibly*, and on one side of the paper only.

5. Replies will not be sent through the post.

6. Queries must reach the office *not later than the 12th of the month*, or they cannot be attended to in the following issue.

*** All communications for this column should be addressed—'*The Query Editor*,' *The Practical Teacher*, *Pilgrim Street, Ludgate Hill, London, E.C.*

General.

1. PATUER.—Use *Casey's* 'Euclid,' or *Mackay's*, for the Euclid, 4-6 and 11. *Wilson's* will do well for the Solid Geometry. *Richardson's* 'Geometrical Conics' will cover all you want beside.

2. BEES.—If we meet with a manual we will tell you of it. No doubt there is one.

3. STUDENT.—There is a manual on the very subject published by Hughes, 4 Pilgrim Street, Ludgate Hill.

4. J.G.—Get the instructions from the S. K. Department, and then set about drawing upon the blackboard at once with the view of being ready next autumn. Put a saucepan (say) on a table, sketch it on a piece of paper, and then make an enlarged drawing of it upon the board without referring to the sketch. Practise in the same way with other articles.

5. NEMO.—Give details. We cannot refer specially. Theory and practice and history are all dealt with more or less in *Sully's* 'Handbook of Psychology,' *Fitch's* 'Lectures on Education,' *Langton's* 'School Management.'

6. BANOVEAN.—The large hand is bold and clear. The down strokes are too heavy, the slopes are not equally inclined. 65 per cent. The small hand is also firm and promising. The capitals are weak. Pay attention to the heights of the strokes, and write less upright. 70 per cent.

7. S. J. D.—What you want is the topography of the district, a small country geography will give the other details. They can be got for a few pence each.

8. STUDENT.—You have written out the answer to your question. Do you want the answer explained? The volume occupied by a gas depends upon its temperature and pressure. If the volume decreases while the temperature remains the same then, by Boyle's law, the pressure must have increased correspondingly. $V P = V^1 P^1$; $4 \times 15 = 3 \times x$; $x = 20$; hence the additional pressure must be that of 5 lbs. per sq. inch. Now, the pressure upon a body immersed in water will increase with the depth and be measured by the weight of the vertical column of water upon an area of a sq. inch. A column of water 11½ feet high, 138 inches, and one inch in section, contains 138 cubic inches, and therefore weighs about 5 lbs.

9. ENQUIRER.—No details are given which would enable us to answer the first three questions. A second class science certificate does not qualify you to *earn* payments upon results. Get a first. Large hand good; 80 per cent. Small hand good, 85. Get *Cowham's* Copy Books, especially numbers 9 to 15.

10. G. R. TUNSTALL.—*Huxley's* 'Physiography,' Macmillan. 'Agriculture,' by *Tanner*, Macmillan.

11. F.O.—Opinions differ considerably as to how such passages should be taken. An examiner is bound to accept any rational system of parsing and analysis. *Let but*, means if only, and the clause is therefore conditional, the principal sentences are those following 'And.' *Pardon me*, can be taken as a parenthesis. *Hear* is of course the infinitive. *Mean* and *go* would be taken as infinitives by some, by most perhaps, *would* and *do* would be taken as auxiliaries.

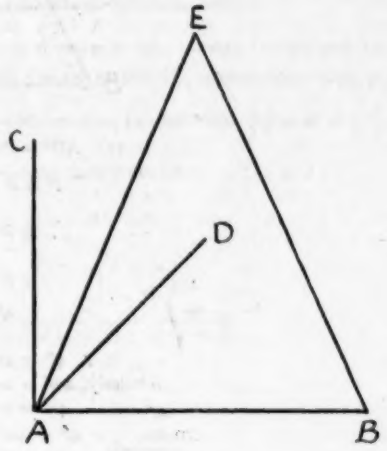
12. G. W. P.—The good ones are too dear, and the bad ones are worthless. Do not buy one. Borrow one or get one from a library. Private students ought not to think of getting one at first. Yes, certainly, many do so. Yes. For Plane Geometry, solid, and conics, see the answer to PATUER in this month's queries.

13. W. P. WILLIAMS.—Yes, we believe it does.

14. ÆNEAS.—If you are using the elementary text book you should go through it to be fully prepared. It does not contain too much. We cannot answer the second part, they would if you took them while in college.

Geometry.

1. J. H. B.—Construct an isosceles triangle which shall have one-third of each angle at the base equal to half the vertical angle. (*Todhunter.*)



Take any straight line AB. At the point A draw AC at right angles to AB. (I. 11.)

Bisect the angle BAC by the straight line AD, and bisect the angle CAD by the straight line AE. (I. 9.)

Then the angle BAE is equal to three-fourths of a right angle.

At the point B make the angle ABE equal to the angle BAE. (I. 23.)

Then ABE shall be the triangle required.

Proof.—The angles ABE, BAE are equal to a right angle and a half, (Con.)

∴ The angle AEB is equal to half a right angle; (I. 32.)

Thus half of the angle AEB is a fourth of a right angle, and is therefore equal to one-third of each of the angles ABE, AEB.

Q. E. F.

Trigonometry.

1. W. J. H. P.—Find the area of a triangle:—

(1) In terms of the perpendiculars p, q, and r, let fall from the angular points to the opposite sides. (2) In terms l, m, and n, the lines let fall from the angular points to the middle points of the opposite sides. (*Science and Art*, 1884.)

(1) Let a, b, c represent the sides of the triangle.

Then, area $= \frac{1}{2} ap = \frac{1}{2} bq = \frac{1}{2} cr$,

$$\therefore a = \frac{2 \text{ Area}}{p}, \quad b = \frac{2 \text{ Area}}{q}, \quad c = \frac{2 \text{ Area}}{r}$$

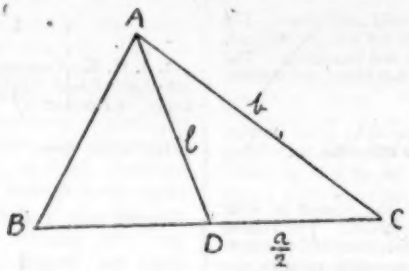
$$\text{Area} = \tfrac{1}{4}\sqrt{(a+b+c)(b+c-a)(c+a-b)(a+b-c)}$$

$$= \tfrac{1}{4}\sqrt{16\,\text{Area}^4 \left(\tfrac{1}{p}+\tfrac{1}{q}+\tfrac{1}{r}\right)\left(\tfrac{1}{q}+\tfrac{1}{r}-\tfrac{1}{p}\right)\left(\tfrac{1}{r}+\tfrac{1}{p}-\tfrac{1}{q}\right)\left(\tfrac{1}{p}+\tfrac{1}{q}-\tfrac{1}{r}\right)}$$

$$= \text{Area}^2 \sqrt{\left(\tfrac{1}{p}+\tfrac{1}{q}+\tfrac{1}{r}\right)\left(\tfrac{1}{q}+\tfrac{1}{r}-\tfrac{1}{p}\right)\left(\tfrac{1}{r}+\tfrac{1}{p}-\tfrac{1}{q}\right)\left(\tfrac{1}{p}+\tfrac{1}{q}-\tfrac{1}{r}\right)}$$

$$\therefore \text{Area} = \frac{1}{\sqrt{\left(\tfrac{1}{p}+\tfrac{1}{q}+\tfrac{1}{r}\right)\left(\tfrac{1}{q}+\tfrac{1}{r}-\tfrac{1}{p}\right)\left(\tfrac{1}{r}+\tfrac{1}{p}-\tfrac{1}{q}\right)\left(\tfrac{1}{p}+\tfrac{1}{q}-\tfrac{1}{r}\right)}}.$$

(See *Capel's* 'Easy Steps in Trigonometry,' Chapter XXIII., in our issue for November, 1887.)



(2) $AD^2 = AC^2 + CD^2 - 2AC.CD \cos C$,

$$l^2 = b^2 + \left(\frac{a}{2}\right)^2 - 2b.\frac{a}{2}.\cos C$$

$$= b^2 + \frac{a^2}{4} - ab.\frac{a^2+b^2-c^2}{2ab}$$

$$= b^2 + \frac{a^2}{4} - \frac{a^2+b^2-c^2}{2}$$

$$= \frac{4b^2 + a^2 - 2a^2 - 2b^2 + c^2}{4}$$

$$\therefore 4l^2 = 2b^2 + 2c^2 - a^2; \quad (1)$$

Similarly, $4m^2 = 2a^2 + 2c^2 - b^2$, (2)

$$4n^2 = 2a^2 + 2b^2 - c^2. \quad (3)$$

$$4l^2 - 4m^2 = 3b^2 - 3a^2. \quad (4)$$

(1) $4l^2 = 2b^2 + 2c^2 - a^2$

(3) $8n^2 = 4b^2 - 2c^2 + 4a^2$

$4l^2 + 8n^2 = 6b^2 + 3a^2$

(4) $8l^2 + 8m^2 = 6b^2 - 6a^2$

$-4l^2 + 8m^2 + 8n^2 = 9a^2$

$$\therefore a^2 = \frac{8m^2 + 8n^2 - 4l^2}{9};$$

Similarly, $b^2 = \frac{8n^2 + 8l^2 - 4m^2}{9}$,

$$c^2 = \frac{8l^2 + 8m^2 - 4n^2}{9}.$$

Area $= \frac{1}{4}\sqrt{s(s-a)(s-b)(s-c)}$

Area^2 $= \frac{1}{16}[s(s-a)(s-b)(s-c)]$

$= \frac{1}{16}(2a^2b^2 + 2b^2c^2 + 2c^2a^2 - a^4 - b^4 - c^4)$

$= \frac{1}{16}[a^2(2b^2 - a^2) + b^2(2c^2 - b^2) + c^2(2a^2 - c^2)]$

$= \frac{1}{16.81}[(8m^2 + 8n^2 - 4l^2)(8n^2 + 8l^2 - 4m^2) + (8n^2 + 8l^2 - 4m^2)(8l^2 + 8m^2 - 4n^2)$
$+ (8l^2 + 8m^2 - 4n^2)(8m^2 + 8n^2 - 4l^2)]$

$= \frac{1}{16.81}[(-128 - 80 + 64)m^4 + (64 - 128 - 80)n^4 + (-80 + 64 - 128)l^4$
$+ (64 - 128 + 160 + 64 + 160 - 32)m^2n^2$
$+ (160 - 32 + 64 - 128 + 160 + 64)n^2l^2$
$+ (160 + 64 + 160 - 32 + 64 - 128)l^2m^2]$

$= \frac{1}{16.81}[288(l^2m^2 + m^2n^2 + n^2l^2) - 144(l^4 + m^4 + n^4)]$

$= \frac{1}{9}[2(l^2m^2 + m^2n^2 + n^2l^2) - (l^4 + m^4 + n^4)]$

$= \frac{1}{9}[(l + m + n)(m + n - l)(n + l - m)(l + m - n)]$

$\therefore$ Area $= \frac{1}{3}\sqrt{(l + m + n)(m + n - l)(n + l - m)(l + m - n)}$.

NOTE.—Each term might have been divided by four before multiplication.

2. RALPHO.—Prove that

$$\frac{\sin(\alpha+\beta)}{\sin\alpha + \sin\beta} = \frac{\cos\frac{\alpha+\beta}{2}}{\cos\frac{\alpha-\beta}{2}}$$

$$\frac{\sin(\alpha+\beta)}{\sin\alpha + \sin\beta} = \frac{2\sin\frac{\alpha+\beta}{2}\cos\frac{\alpha+\beta}{2}}{2\sin\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2}}$$

$$= \frac{\cos\frac{\alpha+\beta}{2}}{\cos\frac{\alpha-\beta}{2}}$$

Arithmetic.

1. EXNING.—A, B, C, having a joint capital of £10,000, buy with ·93 of it a ship and her cargo, the latter being worth two-thirds of the former. The ship is lost, the cargo saved; what amount per cent. on his whole capital does each partner lose?

Value of ship $= \frac{3}{3+2}$ of $\frac{93}{100}$ of amount

$= \frac{3}{5}$ of $\frac{93}{100}$ of amount

$= \frac{93}{166}$ of amount;

$\therefore$ Loss by each partner $= (\frac{93}{166} \times 100)$ per cent.

$= \frac{4650}{83}$ per cent.

$= 56\frac{22}{83}$ per cent. Ans.

2. PUZZLED.—A person, who has £10,257 10s. 3 per cent. stock, calculates that by selling it and investing in 3¼ per cent. stock at 93½, he can increase his annual income by £10 9s.; but, before he can effect the exchange, each stock rises ¼ per cent. By how much is his income really increased?

(*Capel's* 'Catch Questions in Arithmetic and Mensuration.')

Income in first case = 3% on £10,257 10s.
= £102 11s. 6d. × 3
= £307 14s. 6d.;

Income in second case before rise in stocks
= £307 14s. 6d. + £10 9s.
= £318 3s. 6d.;

Amount of stock in second case
$$= £318\ 3s.\ 6d. \times \frac{100}{3\frac{1}{4}}$$
$$= £318\ 3s.\ 6d. \times \frac{400}{13}$$
= £24 9s. 6d. × 400
= £9,790;

∴ Original price of first stock
$$= £93\tfrac{1}{4} \times \frac{9790}{10257\frac{1}{2}}$$
$$= \left(\frac{373}{4} \times \frac{4895}{4105}\right)£$$
= £89.

£ £
93¼ : 89¼ } :: £10,257½ : Income in second case
100 : 3¼ }

$$= \left(\frac{357}{374} \times \frac{373}{385} \times \frac{205\ 15}{80} \times \frac{21}{2}\right)£$$
$$= \frac{101820}{320}£$$
= £318 4s. 3¾d.
∴ Increase in income = £318 4s. 3¾d. − £307 14s. 6d.
= £10 9s. 9¾d. Ans.

3. ROMULUS.—During the first half of the present financial year the income tax was fixed at 5d. in the £. But during the second half it was increased to 8d. in the £. A gentleman, whose income was at the rate of £1,000 a year more in the second than in the first half-year, finds that he pays for the year £35 8s. 4d. more income tax than he would have paid, if his income and the income tax had remained unchanged. Find income and income tax.

(*Capel's* 'Catch Questions in Arithmetic and Mensuration.')

£ s. d. £
(8 − 5)d. or 3d. : 35 8 4 :: 1 : Income in second half-year

20
708
12
3 | 8500
£2,833 6s. 8d.

∴ Income = £2,833 6s. 8d. × 2 − £1,000 ÷ 2
= £5,166 13s. 4d. Ans.

Income tax = (2,333⅓ × 5 + 2,833⅓ × 8)d.
= (11,666⅔ + 22,666⅔)d.
= 34,333⅓d.
= 2,861s. 1⅓d.
= £143 1s. 1⅓d. Ans.

4. TRAWTHORN.—A ship has five masts; the height of one is 72 ft., of two others 63 ft., of the fourth 42 ft.; what is the height of the fifth mast, if the average height of the five is 58 ft.?

Height of fifth mast = 58 ft. × 5 − (72 ft. + 63 ft. × 2 + 42 ft.)
= 290 ft. − 240 ft.
= 50 ft. Ans.

Algebra.

1. CYCLOPS.—Two trains start at the same time, the one from London to Norwich, the other from Norwich to London. If they arrive in Norwich and London respectively 1 hour and 4 hours after they pass each other, show that one travels twice as fast as the other. (*Hamblin Smith.*)

Let x = distance in miles between London and Norwich,

And let a and b = Rates in miles per hour of the two trains;

Then distance from London when they meet $= \frac{x}{a+b} \times a$,

And distance from Norwich $= \frac{x}{a+b} \times b$;

$$\left.\begin{aligned} \therefore \frac{bx}{a+b} \div a &= 1 \\ \frac{ax}{a+b} \div b &= 4 \end{aligned}\right\}$$
$$\frac{4bx}{a(a+b)} = \frac{ax}{b(a+b)}$$
$$\frac{4b}{a} = \frac{a}{b}$$
$$4b^2 = a^2$$
$$\therefore \underline{a = 2b.}$$

∴ Train from London travels twice as fast as the train from Norwich.

2. ROVER.—If r is positive and
$$(1 + r + r^2 + r^3 + \ldots \text{ to infinity})$$
$$\times (1 + p + p^2 + p^3 + \ldots \text{ to infinity})$$
$$= (1 + rp + r^2p^2 + r^3p^3 + \ldots),$$
prove that p must be negative, and that r must be less than ½.

We must assume that r and p are proper fractions.

$$\therefore 1 + r + r^2 + \ldots \text{ to infinity} = \frac{1}{1-r},$$
$$1 + p + p^2 + \ldots \text{ to infinity} = \frac{1}{1-p},$$
$$\text{and } 1 + rp + r^2p^2 + \ldots \text{ to infinity} = \frac{1}{1-rp};$$
$$\therefore \frac{1}{1-r} \times \frac{1}{1-p} = \frac{1}{1-rp}$$
$$1 - r - p + rp = 1 - rp$$
$$2rp - p = r$$
$$\therefore \underline{p = \frac{r}{2r-1}}.$$

Sum of all the terms in the product of $(1 + r + r^2 + \ldots)$ $(1 + p + p^2 + \ldots)$ except $(1 + rp + r^2p^2 + \ldots) = 0$; but all the terms containing even powers of r and p are positive, therefore sums of the terms containing odd powers of r and p are negative; but since r is positive, therefore p must be negative.

Now since p is negative,

$$\therefore \frac{r}{2r-1} \text{ is negative;}$$

but r is positive,

$$\therefore 2r - 1 \text{ is negative}$$
$$\text{or } 2r - 1 < 0$$
$$2r < 1$$
$$\therefore \underline{r < \tfrac{1}{2}}.$$

—o—

My Drawing Examination.

BY A

HEAD MASTER OF A LONDON BOARD SCHOOL.

THE Examinations are conducted by an Inspector appointed by the Science and Art Department, who usually requires complete information before the day of his visit. It is a good idea to make a rough plan of the building, with the accommodation of each room clearly marked, and to enclose it with the paper requiring the 'approximate numbers' for examination. He will then be able to arrange his plan of campaign before reaching the school. If the situation of each Standard in the school is shown on the plan, his work will be still more simplified. Of course the Schedule of names (and a duplicate copy) will be ready for him, so that he can check the numbers, as well as enquire about the 'exceptions.'

As this Inspector has to make a report on the methods of teaching, as well as the supply of apparatus, it is a wise plan to keep him in a good temper. To do this the Teacher will be careful to have everything that will be required on the Examination day properly prepared, carefully examined, and placed where it can be *obtained at once* when required. This should be done on the day immediately preceding the Inspector's visit. On the morning of the examination each child must be supplied with paper (Standard I. a slate each), pencil, rubber, ruler, and set squares. In classes where Geometry is done *every* child should be provided with a pair of compasses, while in Standard IV. every child should have a sheet of 'squared' paper as well as a plain sheet. There will then be no need for giving out anything when the Inspector has commenced his part of the year's work.

On the top of each paper should be found :—

1. Child's Name in full.
2. Standard in which examined in Drawing.
3. Age.
4. Name of School. (If there is a 'school stamp' the name should be stamped with it.)
5. Subject. (Model, Geometry, etc.)

A large number of Examinations have been held in various parts of the country, but up to the present time the methods of the Inspectors have varied little. Probable as time goes on they will become more accustomed to the work, and by that time the Teachers will know exactly what to expect from them. A few specimens of the work recently required in each Standard will now be given.

STANDARD I.

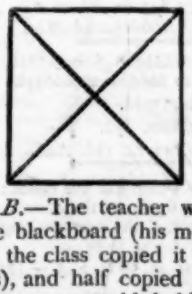
The Inspector usually questions this Standard and Standard II. to ascertain if they have been taught the technical terms used by draughtsmen. He places a figure on the Blackboard and asks for its name. If he sees enough hands up, and gets satisfactory answers to simpler questions, he naturally proceeds to harder ones. The result of this examination is reported as Excellent, Good, Fair, or Indifferent.

The following figures have been drawn on the Blackboard and questioned upon :—

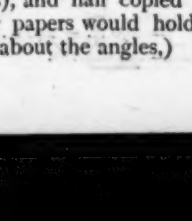
1. A straight line.
2. A crooked line.
3. A curved line.
4. A wavy line.
5. A vertical line.
6. A horizontal line.
7. An oblique line.
8. Parallel lines (*a*) vertical, (*b*) horizontal, and (*c*) oblique.
9. An angle.
10. A right angle.
11. An obtuse angle.
12. An acute angle.
13. A square—the diagonals added after.
14. An oblong, rectangle, or parallelogram (the 3 names required)—one diagonal added.
15. A triangle.
16. An equilateral triangle (term *base* wanted).
17. An acute-angled triangle.
18. A right-angled triangle.
19. A circle.
20. A hexagon.

After this a few questions will probably be asked about the *ruler*, and children will be called upon to show 1 inch, 2 inches, 6 inches, ½ inch, ¾ inch, ¼ inch, &c., upon it.

Various methods have been employed for testing the 'ruler' drawing, and the drawing 'without rulers.' In some instances the slates have had a line ruled across the centre, thus dividing it into two equal parts, and the 'ruler' drawing has been done in one half and the 'freehand' drawing in the other. The more general method is to divide the class into two parts, and to set half to draw with rulers and half to draw without them. The children should then write 'Rulers' and 'No Rulers' respectively on their slates. These slates are examined in the school.



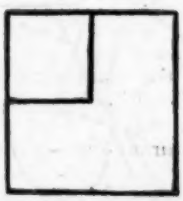
Examination A.—The teacher drew this figure on the blackboard, and the children copied it line by line. The sides were 4 inches in length. Time allowed, 15 minutes.



Examination B.—The teacher was told to place this cross on the blackboard (his method is shown), after which half the class copied it with rulers (with sides of 5 inches), and half copied it without rulers, as large as their papers would hold. (The children were questioned about the angles.)

Examination C.—This was drawn on the blackboard by the teacher, and the children with rulers copied it, making lines 4 inches in length; while those without rulers made it as large as their papers would allow.

Examination D.—The same method was followed with these lines, each of which was 5 inches in length, and the space between any two was 1 inch in breadth.

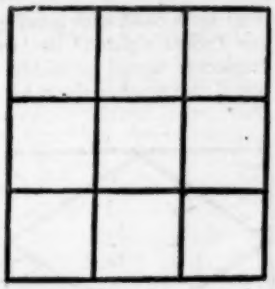


Examination E.—The same method was followed. The sides of the larger square were 4 inches in length, and of the smaller one 2 inches. The diagonal should be drawn as a guide line.

Examination F.—The class was divided into two parts. For half the teacher drew the 'star,' the children copying line by line. This section had no rulers.

The other half copied, line by line, the square standing on an angle. This section used rulers.

Time allowed, 20 minutes.



Examination G.—This class was also divided into two parts. The square, divided into nine equal squares, was drawn by the aid of rulers.

The section of the class drawing the square only used no rulers.

Time allowed, 20 minutes.

N.B.—It will be seen that nearly all the figures are exactly like those given in the official syllabus.

STANDARD II.

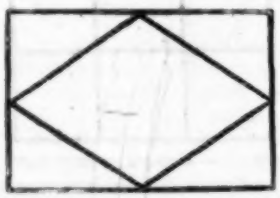
In each of the schools of which the examination is being given, the same copy was drawn by the children in Standard II. as that given for Standard I. The *questioning* was very searching. All the paper work is sent to South Kensington for examination.

STANDARD III.

As there are three branches of work in this Standard, the class is usually divided into three sections, one of which does Freehand, another Geometric Drawing with rulers, and the third Geometric Drawing without rulers. The sections are generally equal in size, and the selection of the work to be done is made by the Inspector, thus requiring each child to be prepared fully in every branch of the work.

Examination A.—The Freehand copy was on a sheet of paper rather larger than a foolscap page, which was placed in front of the class. The lines were thick

enough to be seen by a child with good eyesight; but if there were any 'short sighted' or 'weak sighted' children, the Inspector would probably supply each with a small copy if the teacher drew his attention to them.



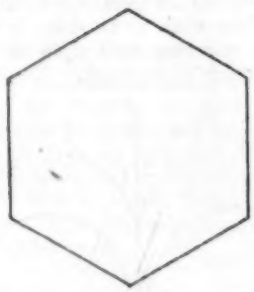
This figure was drawn on the blackboard by the teacher, and copied by the children, who used rulers. The long sides of the oblong were each 7 inches long, and 5 inches was the length of each of the shorter sides.

The third section copied this figure from the blackboard. The only instruction given was to make it as large as the paper would allow. No rulers were allowed.

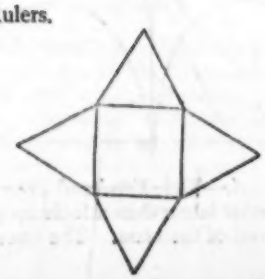
Examination B.—This examination was conducted in exactly the same manner as the last mentioned. The three copies given were:—

(*a.*) Freehand.

(*b.*) Rulers.

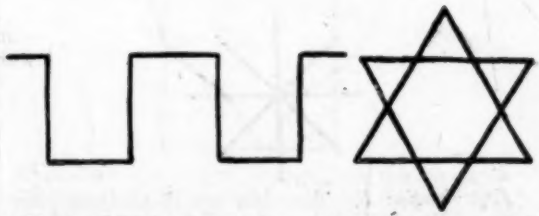


(*c.*) No Rulers.



Examination C.—Each child in this section was given a card with this figure upon it, and was told to copy the figure, enlarging it to the size of the paper. Time 30 minutes.

A second copy was placed on the blackboard, in front of the class, and the second section was told to make a drawing like it as large as the paper would allow. Time 30 minutes.

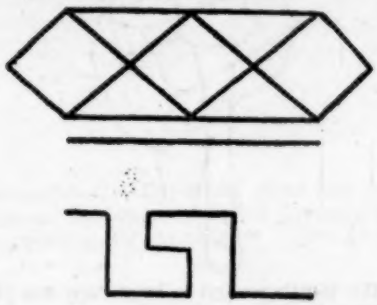


Every child in the third section was given a card with these two figures upon it, and was told to copy them, using rulers. Time 30 minutes.

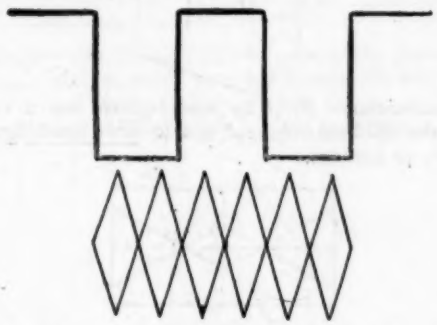
Examination D.—The class was divided into two sections. Each child was supplied with a card on which was a copy. The time allowed was 40 minutes.

(*a.*) Freehand copy.

(*b.*) Copies to be drawn with rulers.



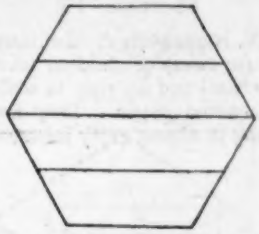
Examination E.—The class was divided as in the last examination, but the freehand copy was on a large sheet in front of the class. The copy was like the one given in *Examination B.* In the geometry section each child had a card on which were the two following copies, to be drawn with rulers :—



Examination F.—This class was divided into three sections.

Each child in the first section was given a card and told to copy the figure upon it on the drawing paper, taking care to enlarge it. Time 30 minutes.

This figure was drawn on the blackboard by the teacher, and copied by the children, who did not use rulers. Time 30 minutes.



Each child in the third section copied the given figure from the blackboard, using rulers. Time 30 minutes.

Examination G.—This class was divided into five sections.

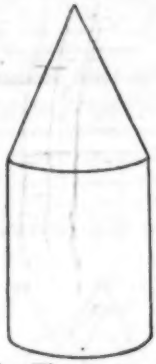
The children in the first section copied the given figure from a large sheet of paper placed in front of the class.

This figure was drawn upon the blackboard by the teacher, when the second section copied it, using rulers, and the third section copied it, not using rulers.

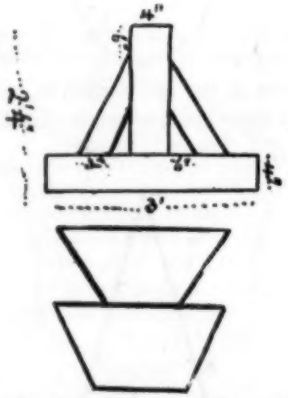
The teacher drew this figure upon the blackboard, and the children in the fourth section copied it, using rulers, while those in the fifth section copied it, without using rulers.

STANDARD IV.

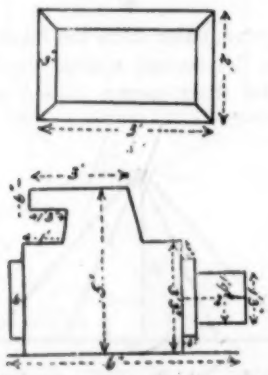
Standard IV. is generally divided into four sections, the front row (or rows) of children taking model, and the others freehand and drawing to scale (*a*) with and (*b*) without squared paper. They are arranged to prevent copying in almost every instance.



Examination A.—The cone standing upon a cylinder was given for model, the children being told to make a *large* drawing. Time, 40 minutes.

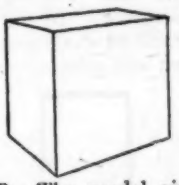


For scale drawing the two copies to be drawn on plain paper were upon a card. The first was to be drawn to a scale of 1" to 1', while the second was to be copied twice the given size. Time, 40 minutes.

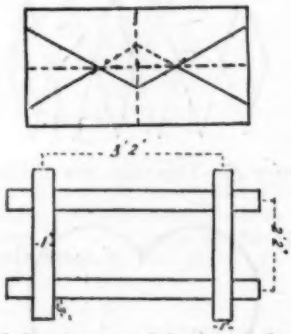


Each child in the section which used squared paper was supplied with a card, on which were two copies, the first to be drawn to a scale of 1" to 1', and the second to a scale of $\frac{1}{2}$" to 1'. Time, 40 minutes.

For the fourth section a large copy was placed in front of the class, and each child was required to make a drawing which would fill the paper he was using. Time, 40 minutes.



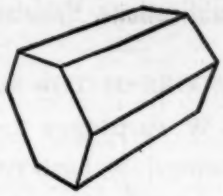
Examination B.—The model given was a cube. and the children were told not to draw small figures, Time, 40 minutes.



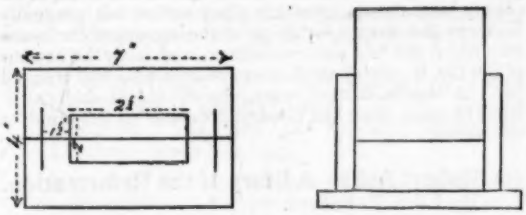
Each child drawing on plain paper for scale drawing was given a card on which there were two figures, the first to be copied three times the given size, and the second to a scale of 1" to 1'1". Time, 40 minutes.

The card given to those who used squared paper was like that given in *Examination A*. Time, 40 minutes.

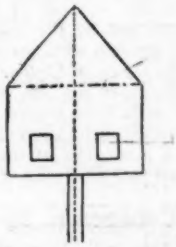
The freehand copy was placed before the class, with instructions to make a large copy. (In this instance the copy was placed to the right of the class, which made it very difficult for those on the left, on account of *foreshortening*.)



Examination C.—The model given was the hexagonal prism. Although this is not a rectangular solid it is frequently set for examination. Time 40 minutes.



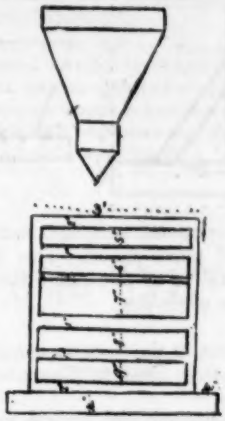
Each child drawing to scale on plain paper was given a card on which were two figures, the first to be drawn to a scale of ¼" to 1", and the second to be copied twice the given size. Time 40 minutes.



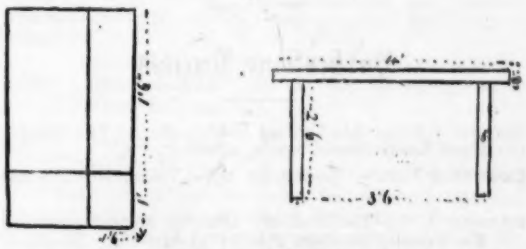
The card given to each of those who used square paper had a figure to be copied and this question :—'Draw a scale of half an inch to the foot, showing 3' 6".' Time 40 minutes.

The freehand copy was placed in front of the class, being on a large sheet of paper. Time 40 minutes.

Examination D.—In the model drawing section the children were given a blackboard with a cone standing upright. The blackboard was to be drawn, and this proved the chief difficulty in the examination.



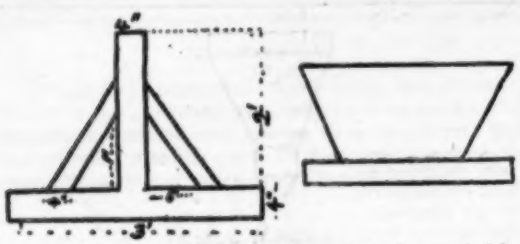
A card was given to each child in the section that did drawing to scale on plain paper. There were two figures to be drawn, the first was to be copied twice the given size, and the second to a scale of 1' to the foot.



The difficulty experienced by the children in the other section was to make the figures appear correct, as the lines were out of proportion in the copy. The first figure was to be copied, allowing each side of a square to represent one inch, and the second was to be copied, allowing each side of a square to represent two inches.

Each child was given a card in the section that did freehand.

Examination E.—A flower-pot was placed on the floor in front of the class, and the model section copied it, being instructed to make a *large* drawing.



The Cards contained two figures to be copied by those who used plain paper. The first was to be drawn to a scale of 1" to 1', and the second to be copied twice the given size.

The card given to the section using squared paper was exactly like that given in *Examination D.*

The Freehand copy was similar to that given in *Examination B*, but only 35 minutes were allowed to complete it.

(To be continued.)

Publications Received.

BLACKIE & SON.—The Century Reader, No. 4; The Century Home Lesson Books, Nos. 1, 2, and 3.

CURWEN & SONS.—Choruses for Equal Voices, Nos. 110 and 112.

DAWSON, A. G.—The Teachers' Drawing Manual (*Bridge*); The Townley Standard Practical Arithmetics. Standards II. and III. (*Beard*); Answers to ditto; Bridge's Demonstration Sheets, Standard IV.

DEAN & SON.—Corner's History of Ireland.

FISHER UNWIN, T.—The Century and St. Nicholas Magazines, January; The Century Magazine Christmas Number.

HEYWOOD, JOHN.—Handbook to the Code Examinations, Standard II.; Science Lectures for the People, Nos. 7 and 9; Maternity (*O. S. Fowler*).

LONGMANS & CO.—Petit Théâtre des Enfants (*Mrs. Hugh Bell*); Memoir of William Ellis; Longmans' Elementary Science Manuals: Building, Construction (*Burrell*); Elementary Mathematics; Epochs of Modern History: The English Restoration and Louis XIV. (*Osmund Airy*); Lessons in Elementary Mechanics (*Grieve*).

MACMILLAN & CO.—Progressive French Reader, Part 2 (*Eugène-Fasnacht*).

MARCUS WARD & CO.—Garry's Elocutionist.

MURBY, T.—Music—'Excellent:' The Grind-e-Lay of a First Class C.M. (*T. Murby*).

NELSON, T., & SONS.—'Royal' Object Lesson Series, Sheet No. 1; Reader; Notes of Lessons. The Principles of Agriculture, Third Stage (*Jerome Harrison*).

PARTRIDGE, S. W., & CO.—Prizes: More Precious than Gold (*Jeannie Chappell*); The King's Daughter (*Pansy*); Robert Aske (*E. F. Pollard*); Vashti Savage (*Sarah Tytler*); Jack the Conqueror (*Mrs. Bowen*); 'A 1' for December.

PHILIP & SON.—The Educational Annual for 1889.

SMITH, ELDER & CO.—The Cornhill Magazine, December and January.

SWAN SONNENSCHEIN & CO.—Parallel Grammar Series: Latin, Part I.; French, Part I.; English, Part II.; German, Part I.

THIN, JAMES.—Workshop Notes and Sketches in Woodworking. (*T. A. Clark*).

WILLIAMS & NORGATE.—Kaiser Wilhelm I. (*Rühle*).

Publications Reviewed.

GIFT BOOKS OF THE SEASON.

S. W. Partridge's List.

(1) Nashti Savage. By Sarah Tytler.

The story of a runaway gipsy girl, picked up by a kindly, good-tempered, easy-going gentleman on a dark night, and taken first to one house on his estate, then to the poorhouse, to others, and lastly into his own house. Girls—and boys, too—will become thoroughly interested in the wild, untutored creature, who never completely loses the traces of her gipsy nature, but gradually becomes the servant and friend of the inmates of the house into which she has been introduced, and lastly the saviour of the life, if not of the honour, of him who had rescued her. A simple, natural story, gracefully told, and calculated to leave none but good impressions on the mind of the reader.

(2) Robert Aske: A Story of the Reformation. By Eliza F. Pollard.

The character whose name gives the title to the story is perhaps not the one in which the reader will be most interested in this beautiful volume. William Tyndale, the translator of the Bible, with his earnest desire to finish his work; his friends, Christopher Aske, the cripple Lisbeth, and the dwarf Triboulet, all take a great part in contributing to the interest of the story. But the reader will be attracted by the manly, straight-forward conduct of Aske himself, who became one of the chief leaders in the Pilgrimage of Grace in Henry's reign, and finally paid the penalty of his life through the machinations of Reginald de la Pole, whose plots for the destruction of Tyndale and the restoration of the Catholic Church in England form a great part of the story. It is a book with a purpose, and that purpose well served.

(3) Jack the Conqueror. By Mrs. C. E. Bowen.

Just the book that will do good to struggling lads anxious to do well, in the midst of unpropitious circumstances. Jack was an orphan living with a crabbed aunt, who neither clothed, fed, nor educated him properly. A chance meeting with an artist puts new thoughts into his head, and his efforts to become clean, respectable, and educated, are vividly described. His success in gaining a scholarship opens out for him a career, and the ragged, unkempt youth eventually becomes the loved and trusted tutor in a college, eagerly helping all who, like himself, had a great deal to do in the early struggle for existence. 'Resolve well and persevere' will, we are sure, become the motto of many a reader of this bright little story.

(4) The King's Daughter. By Pansy.

Dell Brouson, the heroine of this temperance story, was no earthly king's daughter, but the only child of a saloon keeper in one of the States. She had been brought up at her uncle's, but at eighteen her father sent for her to keep his house. The change was hard to bear, but she had learned to think of another than an earthly home, and she cheered herself by remembering the 'many mansions' and of being a 'King's Daughter.' Then the authoress tells of Dell's practical Christianity, of her efforts to reform the village, of her influence with the vilest and worst characters in the place; she tells of her trials and triumphs, her failures and her successes. This is done in no goody-goody style, but with a naturalness and cheeriness which extract sympathy with her heroine, and a desire for her final triumph in her self-imposed task. Many a young girl should feel tempted to follow her good example and become sharer of her satisfaction and crown of rejoicing.

More Precious than Gold. By Jennie Chappell.

This is a love story. Ivy Leaf, brought up by two garrulous maiden ladies, is engaged to a good, rich young man called Atherton, but she prefers a wandering artist called Druce and runs away with him when she finds out that Atherton is intending to give up his fortune to the rightful heir if he can be found. Of course the good young man remains constant to his worthless fair one and by and bye finds her out deserted by her husband and in want. At the same time by some wonderful process told in an indifferent way it turns out that Ivy Leaf is the heir to the property he has given up. The worthless husband appears on the scene, drinks and gambles the fortune away, and almost kills himself in an attempt to shoot his rival, whom he hates. The good young man nurses him till he dies and then marries his widow. It is a vapid story, and is not mended in the telling by the extravagant use of adjectives generally of the superlative kind.

Earth Knowledge (*Part II.*): a Text Book of Advanced Physiography. By W. Jerome Harrison, F.G.S., and H. Rowland Wakefield. London: Blackie & Son.

This volume, like its predecessor (Part I.), is the work of two demonstrators engaged in the teaching of science under the Birmingham School Board. The geological portions of the book, and those introducing the laws of physics, are well done. The difficulties attending a simple form of explanation of astronomical phenomena are manifest, and we think they would have been more satisfactorily overcome had the writers introduced more plentifully the power of diagrammatic illustration which they know so well how to use. The omission of any reference to the '*Equation of Time*' in the account of terrestrial longitude is serious, in view of last year's questions in physiography. There should also be a fuller explanation of the reason of the moon's influence in producing a tide being greater than that of the sun. Science teachers who require a concise statement of the main truths of the advanced course in physiography for purposes of revision will do well to examine this volume for themselves.

Historical and Commercial Geography, and Atlas. By Dr. Dick. London: Thomas Murby.

This excellent work is a complete elementary geography for schools; it is a new and enlarged edition, with its facts corrected to the present date, and beautifully illustrated by twenty-four engraved and coloured maps. The association of the facts of political and historical geography is a very valuable feature in this work, as is also the connection everywhere struck between the physical and commercial geography of each district. When we consider the amount of matter here presented, its excellent arrangement, and the splendid maps which fully illustrate the text, we are compelled to admit that no better geography at the price is available for the student of elementary geography.

Elementary School Atlas. By J. Bartholomew, F.R.G.S. London: Macmillan & Co.

This Atlas presents several novel features of value to the youthful student of geography. The Hemispheres, drawn from six different points of view, is a capital idea, and will do much to give a correct notion at first of the world as projected on a flat surface. Map 3 is another very valuable feature; here we have two bird's-eye views of typical geographical facts, and accompanying each picture is a map, thus showing clearly the distinction between a picture and a map. The main truths of Physiography and Physical Geography are admirably illustrated, as are also the principal facts of descriptive, political, and commercial geography. Everything likely to be introduced into an ordinary course of school geography is well illustrated, and at the same time presented in a most attractive style.

Garry's Elocutionist. London: Marcus Ward & Co., Farringdon Street.

Mr. Garry has produced an admirable and varied collection of pieces suitable for recitation or reading on the platform or in the drawing-room. Some are old favourites, but many are new, copyright, and unhackneyed. The book is a welcome addition to those we have hitherto had compiled for the same purpose. Mirth-provoking and sympathy-rousing pieces are judiciously blended, and if the directions given in the sixteen-page introduction are followed by the reciter, much pleasure will be afforded to the audience privileged to hear the pieces declaimed.

Standard Teaching Helps. Part V. By H. Major, B.A., B.Sc. London: A. G. Dawson, Ivy Lane.

Mr. Major is a prolific writer, but what he does he usually does well, and this book is no exception to the rule. There is no part of the work required by the Second Standard in any subject omitted, and the best method of teaching the subject known to a practical teacher of Mr. Major's experience has been incorporated. Where the class teacher wishes to produce good results by intelligent teaching, and especially where the head teacher is so much engaged as to be unable to give constant help and supervision, the book will prove of decidedly good service. Young teachers, and teachers who have had little or no training, cannot have a better guide.

Livy. Book XXII. By L. D. Dowding, M.A. Deighton Bell and Co.

Livy. Book XXII. By M. T. Tatham, M.A. Clarendon Press.

Of these two editions the former is professedly intended for the use of 'advanced students, especially at the universities,' and therefore deals with questions of text which Mr. Tatham, editing for schoolboys, rightly leaves untouched. Both are parts of larger works, Mr. Dowding having already published an edition of Book XXI., and Mr. Tatham's book being simply a section of his larger volume containing Books XXI.—XXIII., the only important difference being the insertion of two useful maps for the Trasimene Lake and Cannæ. It is to be regretted that Mr. Dowding did not adopt the same expedient. His note on the vexed question of the site of the battle is very inadequate. It is curious to observe that the two editors from premisses almost verbally identical draw exactly opposite conclusions. Mr. Dowding says (ch. 45, s. 6), 'as the Romans faced south, and had their right on the river, it seems evident that the battle took place on the left or north bank.' Mr. Tatham on ch. 43, s. 11, says, 'as the Romans faced south, with their right nearest the river, and the river runs N.W., it is clear that the battle must have been fought on the right (S.E.) side of the river.' The annotation in Mr. Tatham's book is generally clearly put, and sufficient for the objects it seeks. We doubt the correctness of his explanation of the *moratus* in the first chapter. It is tolerably clear that the reference is to a possible further stay amongst the Cisalpine Gauls, where Hannibal had wintered. It was dangerous to remain there longer, for the reasons which Livy goes on to detail in the following sections. If so, the reference to the passage in Book XXI. is not to the point. In his note on ch. 42, s. 1, the editor repeats the undoubted error of his earlier edition. The *stationes* were, as Mr. Dowding points out, the *Carthaginian* pickets, and *subductæ* has its common sense of 'withdrawn.' The two circumstances which surprised the Romans were the withdrawal of Hannibal's pickets, and the silence in his camp. Nor in ch. 59, s. 10, is there any advantage gained by translating *ne illi quidem—se prætulerint*, '*let* not those, *&c.*' It gives as good sense to translate '*not even* those, *&c.*:' the use of the completed for the simple future is natural, and the *merito* which, as the editor has

seen, is rendered superfluous by his construction, takes its right place in the sentence. In Mr. Dowding's edition, whilst recognising much industry and ingenuity, it is impossible to express complete satisfaction with the results of his critical labours. Neither his emendations nor his defence of the MSS. readings as a rule carry conviction with them. In ch. 1, s. 16, he keeps *præfarentur* and rejects the usual emendation of *profarentur;* but the passage in Bk. V., ch. 43, which he quotes in support, tells rather against than for his contention. His conjecture of *inter fortunæ minas et saxa*, in ch. 16, s. 4, can hardly be held satisfactory. In ch. 3, s. 6, it is easier to see an instance of Livy's carelessness about geographical accuracy than to accept the emendation of *praeterieus* for the MS. *petens*. The defence given of the reading *dictatorem* in ch. 8, s. 6, is not very strong: at any rate the argument on the other side is overwhelming. Are we to believe that Livy wrote '*because* the people had no power to create a dictator, as they never had done till now, the people created Fabius dictator?' There is, by the bye, a misprint of *praetor* for *prodictator* at the end of this note. In explanation of Hannibal's odd exclamation at the battle of Cannæ, *quam mallem vinctos mihi traderet*, it may be suggested that his meaning was 'He might as well have put them into my hands bound hand and foot, and spared me the trouble of fighting.' Livy was much more likely to put such a contemptuous phrase into Hannibal's mouth than give him the credit of a humane desire to avoid unnecessary bloodshed. It is a strange oversight to have allowed the insertion of a map of Italy to illustrate Book XXII., which does not extend far enough to the north to include the Trasimene lake; and for the sake of economy of space, it would have done no harm to omit such notes as that on the origin of the name *Gabii*, 'said to be abbreviated from Galatus and Bius, the reputed founders,' and the record of the editor's journey from Rome to Tibur by steam-tram, and his admiration for the *Cascastelle* (*sic*) at that place.

Ajax of Sophocles. Edited by F. A. Paley, LL.D. Cambridge Text Series. Deighton Bell & Co.

By the cheap, and in most respects admirable, editions of single plays of the Greek tragic poet which Dr. Paley has done for this series, he has rendered a very acceptable service to teachers and learners in our schools; his work has materially enlarged the range of selection for school reading; the master can, with confidence, put into the hands of his boys editions which have the guarantee of Dr. Paley's high and deserved reputation as a scholar. With regard to the critical exegesis of the text, Dr. Paley's authority will always and justly give great weight to his conclusions. Even where we dissent we feel that they are the deliberate verdict of a learned and able commentator; the annotations do not disclose any traces of haste or carelessness; if they err at all it is rather on the side of over-elaboration for an edition intended chiefly for school use. Perhaps it may be allowable to point to what we cannot help considering a grave defect in Dr. Paley's work, looking at it as an instrument of education: we mean the almost complete absence of any expressed appreciation of the play as a noble example of the art of one of the world's greatest dramatists. For the paragraphs in the preface on the character of Ajax, Odysseus, and Tecmessa are not calculated to awake the sympathy and direct the admiration of the young reader to the wonderful picture of the proud heart of Ajax tortured by the sense of a shame which he can neither brook nor repudiate. Nay, we think our complaint might be extended, and that the commentary frequently obscures the brilliancy and enfeebles the force of the original to a quite unnecessary degree, and especially by the inadequacy, the prosaic *banalité* of its versions. When Teucer's messenger reaches the tent of Ajax only to find him gone, and the last hope of saving him vanished, what could more surely destroy in a boy's mind any sense of the tragic intensity of the occasion than to render the messenger's cry *'Ιοῦ, Ιοῦ | βραδεῖαν ἡμᾶς δε' ὁ τήνδε τὴν ὁδὸν | πέμπων ἔπεμψεν* by 'Dear, dear! Gone out? Then it is too late,' &c. A like note of incongruity is struck at the outset of the play, where *μετρόυμενον ἴχνη τὰ κείνου* is explained, 'comparing with his (big) feet the size of the marks'! Such lapses as these strike one as a kind of indignity inflicted on the great poet; and it seems to us a chief merit of the younger generation of Cambridge scholars that they have felt and sought to illustrate the classics as splendid literary achievements as well as subjects for philological criticism. Take Professor Jebbs' Sophocles, not yet completed, and Mr. Sandy's edition of the Bacchæ of Euripides, as examples.

Suggestive Lessons in Practical Life. Smith Elder and Co.

We noticed these books upon their first appearance, and we pointed out how useful, suggestive, and attractive they were. To a large extent they are original in the way of reading books: they were not designed for any special standard or code. They were intended to arouse interest in all that is of most importance to us, and as far as possible to satisfy it; to inspire, as the author tells us, an intelligent zeal in the pursuit of useful information; to make the art of reading itself a pleasure;
from the new fields of thought. It opens the useful inquiry. We are not surprised to see a new edition; we hope to see many more. Boys are sure to like it, and when they begin it they are sure to read it through.

The Townley Standard Practical Arithmetic. Standards II. and III. By William S. Beard. London: A. G. Dawson, Ivy Lane.

Suitable, well-arranged little books of graduated examples, both mechanical and problematical, for the two standards named. The answers are correct, and well printed on separate sheets.

Physiography. (Elementary Course.) By Andrew Findlater, M.A. New Edition. London and Edinburgh: W. and R. Chambers.

The appearance of a new edition of this work is very opportune, as the newly arranged syllabus requires additional matter to that which has proved very serviceable in the former editions.

The chapters on the various forces of nature are excellent, the matter being sufficient, clearly stated, and fairly well illustrated. When, however, we come to the chapters dealing with the changes these forces have effected in the structure of the earth's crust the matter becomes somewhat meagre and disappointing. In the **mineral** section, *e.g.*, if we look for *felspar*, all we find is that it 'is usually of a pink or red colour, it is not so hard as the other (silica) and may be scratched but not easily.' We doubt whether so meagre a statement upon this important group of minerals is sufficient for a pass even in the elementary stage. In the chapter on **Rocks** there is no attempt at a complete classification the igneous being dismissed in a page and a half; the terms Granitic, Volcanic and Basic, and Intermediate, do not appear; whilst such individual rocks as Pumice, Basalt, Gabbro, and Obsidian, do not seem to be even named. Occasion has been taken upon the re-issue to add to the chapter on coral formations. The new Theory of Atolls by Dr. John Murray should be known, but the value of the chapter is completely discounted by the introduction of the erroneous and most misleading term, '**coral insect.**' On page 87 it is stated that a submerged forest is found 'on the coast near Lincoln;' this should be at Mablethorpe on the Lincolnshire coast. Again on page 131, Snow is stated to be 'just ice in a granular condition' instead of in a crystallized condition. The old notion that 'heated air and other gases are ascending above the fire and the colder and heavier air around is pressing in to supply the **vacancy** (?)' is continued and repeated. Again it is found on page 134 under the heading of Sea and Land

Breezes, 'The air above it (the land) ascends and the heavier air from the sea rushes in.' The phrase 'how ice becomes plastic' is unfortunate, for the context shows that ice is not plastic. The last paragraph in the syllabus including **'The movements of the earth and their results'** with no less than nine sub-sections are entirely absent from this new edition and will necessitate the purchase of another book in order that the student may cover the essential portions of the Science and Art Syllabus.

The Century Primers. Nos. 1 and 2.
The Century Infant Reader.
The Century Readers. Nos. 1, 2 and 3. London: Blackie and Son.

This new series of reading books appears in strong and neatly designed covers of the bright red colour which has recently become the fashion for school books. Thus outwardly attractive, they appear on examination to be no less pleasing and satisfactory in the arrangement and character of the lessons they contain. In the Primers and Infant Reader, the type is clear; the new words are carefully introduced; good use is made of the principle of analogy in classifying words of similar sound and regular spelling; and there is an abundant supply of new and amusing illustrations.

The volumes for the Standards are marked by many excellent features. There is considerable freshness about the matter of the lessons. In many cases the interest is made continuous, by the subject or story being carried on through a series of lessons. Moral teaching of a most desirable kind is given in a most attractive and impressive way, as in the story of 'The Haughty Harvest Mouse' in Book III., and many others. Exercises in Dictation and Grammar are appended to nearly every lesson. At the end of each book we find a course of grammar lessons for the Standard, a selection of pieces suitable for repetition, lists of difficult words for revisal, and a set of note and time tests, both in the Tonic Sol-fa and the Staff Notations.

The University and Civil Service Arithmetical Examiner. By W. S. Beard. London: A. G. Dawson, Ivy Lane.

Mr. Beard has collected a large number of questions given at various examinations, and arranged them in 120 sections, according to the rules of Arithmetic to which they belong, each section containing seven sums. To each question a letter is affixed signifying the examination from which it has been culled, and answers are given to the examples with full solutions to theoretical questions. In an appendix various reference tables, rules, and uncommon formulæ have been placed. It is thus hoped that the book may serve the double purpose of a guide to the examinations and an additional exercise book suitable for revision purposes in higher and secondary schools. The book is well got up, clearly printed, and reasonable in price.

Wall Map of England and Wales. Edinburgh and London: W. and A. K. Johnston.

This is a very effective production, and ought to come into decided favour. Amongst those points which seem somewhat distinctive in this map are the following: the rivers are printed in dark blue, the sea in light blue, the hills in brown, whilst the various counties are separately coloured red, green, yellow, purple, or brown, so that all possibility of confusion is avoided. The population of the various towns is shown by symbols and different types of lettering, and as also the heights of the chief mountains are given, and battlefields, cathedral towns, and county towns indicated, it will be seen that a large amount of information other than that relating to mere place-position is embodied in this map.

Examples for Analysis in Verse and Prose from well-known sources. Selected and arranged by F. Edwards. London: George Bell and Sons.

The teacher desirous of making his lessons in grammatical analysis bright and interesting by the use of suitable and striking examples of good poetry and prose, will find in this little book a valuable store of extracts, carefully graduated and arranged in three sets,—first, simple sentences; second, complex sentences; and third, miscellaneous examples. The passages vary from single lines from classical English compositions, to whole sonnets of Keats, Mrs. Browning, Matthew Arnold, and long passages of Ruskin and Emerson's beautiful prose. It should be noted that the examples are not accompanied by any hints or suggestions on their treatment.

Blackie's School Classics: The Tragedy of Macbeth, by Shakespeare, with Notes. The Tragedy of Hamlet, with Notes. The Tragedy of King Lear, with Notes. London: Blackie and Son.

To their series of School Classics, Messrs. Blackie have recently added neat and handy editions of three of the great tragedies of Shakespeare. The text followed is that of the Globe Shakespeare, and the plays are abridged by such omissions only as are desirable in adapting them to school use. In each book is printed a brief introduction, which includes a readable account of Shakespeare and his poetry, and an outline of the particular play which follows. The notes are printed at the end with reference numbers to the lines. They appear to be of the most serviceable kind, being brief and to the purpose, and free from that needless elaboration which is apt to bewilder the minds of young students. The books will serve as reading books for the highest classes in elementary and other schools, and as text books for pupil teachers and other students.

The Royal Upper Class Readers. Great Authors. First Period—Chaucer to Pope. London: T. Nelson and Sons.

This volume completes an admirable set of three literary reading-books, the two dealing with later periods having been issued earlier and already noticed in these columns. The great authors whose lives are here recorded in simple but impressive manner, and whose works are suitably exemplified, include the loftiest of our poets and the most famous of our prose writers. Chaucer, Spenser, Shakespeare, Milton, Dryden, Pope, are names that stand highest in our roll of poets, and Bacon, Bunyan, Defoe, and Addison fitly accompany them. The young student who is introduced to such master-minds through the medium of this Reader is likely to find the acquaintance so pleasing and interesting that he is likely to take further opportunities of improving and extending it. We most heartily repeat our commendation of this series, which is produced in Messrs. Nelsons' well-known attractive style.

Poynter's South Kensington Drawing Book: Freehand for Children. By E. J. Poynter, R.A. London: Blackie and Son.

If there is a possibility of developing the artistic faculty in children at all, it should be done by means of these graduated examples of common things. The whole of the examples have been chosen from objects children see around them daily, and as there are guides to simplify the work, and full instructions in simple language, the beginner is sure to be interested and encouraged to persevere, and by the time he has mastered the four books he will have no mean idea of beauty of form, correctness of drawing, and ability to execute the admirable models here given.

The Jubilee Series: Reader for Standards V. and VI. London: Bemrose and Sons.

Though the Jubilee Year has passed many of its tokens remain to us. Here we have the final volume of a series of Jubilee Readers. It is distinguished by remarkably bold and clear type, and contains a good selection of lessons. Many of these are old favourite from well-known authors, while others have the novelty that belongs to recent newspaper articles on interesting subjects, such as 'Earthquake Terrors,' occasioned by the shocks in the Riviera, and 'The Bookstalls and Libraries.' Narratives of 'the Coronation of Queen Victoria,' 'the Children's Jubilee Fête,' in Hyde Park, and 'Jubilee Reflections' may be held to justify the title of the book. The plan of adapting one reading book for the two Standards which have in so many schools to be taught together is a common-sense arrangement, and will help to make this Reader widely acceptable.

Clarendon Press Series: Milton. Paradise Lost. Book I. Edited by the Rev. H. C. Beeching.

In this edition the text of the First Book of the great English epic is preceded by a short introduction on the Life and Works of Milton, and the nature of Epic Poetry, and an essay which for an ordinary reader may be regarded as almost exhaustive on the elements of Milton's blank verse in Paradise Lost. Most abundant notes follow the text; and, so that all classes of students may find advantage in using them, simple explanations are included, as well as more elaborate annotations on peculiarities in Milton's language, and comparisons of certain passages with others from Homer, Virgil, Horace, Tasso, Spenser, Shakespeare, and other writers.

Clarendon Press Series: Johnson's Lives of the Poets. Milton. Edited, with Notes, &c., by C. H. Firth, M.A. Oxford: Clarendon Press.

Johnson's Life of Milton deals in many respects unfavourably with the great poet. Still it is a work of classical rank, and deserves the careful attention of the student. In this edition Mr. Firth increases the advantage of a study of the work by his carefully written introduction, and by the copious and scholarly notes which serve not only to illustrate and explain the text, but to correct mistakes and wrong impressions which Johnson's sentences may convey. In his annotations the editor has drawn from Milton's own works, from records of his contemporaries, from Johnson's other writings, from Dr. Hill's edition of Boswell's Life of Johnson, from Professor Masson's Life of Milton, and many other sources to elucidate the text.

Code Wrinkles. Selected by J. L. Richardson. London: George Philip and Son, 32, Fleet Street.

A little booklet of about forty pages, with an index, containing official decisions respecting difficulties which have arisen in the interpretation of Codes, Minutes, and Circulars, and in the practical management of Schools. It will be a handy little reference book for both managers and teachers.

The 'Practical Teacher' Sale and Exchange Column.

Wanted.—Nos. 21, 27, 28, 29, 37, 38, 39, of last issue of 'Cassell's Popular Educator.' Will exchange first twelve Nos. of 'Cities of the World,' or cash.—Geo. W. Phillips, St. Helens, I. W.

A. G. DAWSON'S EDUCATIONAL SERIES.

THE TOWNLEY GEOGRAPHICAL READERS.

THIS Series of GEOGRAPHICAL READERS covers the entire range of the Standards from I. to VII., and meets, in every particular, the latest requirements of the 'Revised Code.'

The various books of which the Series consists, have been written and compiled by practical men, distinguished among the ranks of Certificated Teachers by their wide experience and high professional reputation.

In nearly every case, too, the books have been carefully read, and their general scope suggested by several of H.M. Inspectors of Schools.

The following distinguishing features are claimed for the Series:—

1.—The vocabulary is carefully *graded* to suit the varying Standards.

2.—Geographical *ideas*, and not merely geographical *facts*, are presented in a graphic, attractive, and agreeable form.

3.—The *facts* of geography are unfolded in a shape calculated to quicken the intelligence, and to excite and stimulate the imaginations of the readers.

4.—The latest results of geographical discovery and investigation have been laid under contribution, and the narratives presented in a popular style.

And, lastly, the pictures and maps are all appropriate to the text, and have been used by the writers to strengthen the conceiving powers of the children grounded on distinct lines of observation and experience.

PRICES OF THE SERIES.

STANDARD	I.,	cloth boards,	112	pages	...	9d.
"	II.,	" "	128	"	...	1s. 0d.
"	III.,	" "	190	"	...	1s. 3d.
"	IV.,	" "	192	"	...	1s. 3d.
"	V.,	" "	224	"	...	1s. 6d.
"	VI.,	" "	*Preparing.*			
"	VII.,	" "	*Preparing.*			

'The author has exhibited with great clearness the educative art of placing before his readers a true mental picture of the country we inhabit. The contents include an astonishing mass of practical and intelligible facts, and yet the mind is left free from distraction, as the pupil discovers for himself that there is something to understand, as well as to commit to memory. It is far and away the most "readable" of any book we have met with of a kindred nature.'—*The Schoolmistress.*

COMPLETE CATALOGUE OF EDUCATIONAL WORKS ON APPLICATION.

A. G. DAWSON, 14, IVY LANE, PATERNOSTER ROW, LONDON, E.C.

COUGHS! THROAT! VOICE!

NO OPIATE

"MITRE" LOZENGE

For TEACHERS who EXERT the VOICE.

The MITRE LOZENGE possesses singular power in clearing the Voice, giving it tone and strength, soothing the bronchial organs, getting rid of Huskiness, Soreness, Dryness, and all kindred troubles. It also allays irritable or Hacking Cough, whether troublesome in the daytime, or, as is frequently the case, *causing a broken night's rest.*

As the MITRE LOZENGE CONTAINS NO OPIATE OR ANY OTHER DELETERIOUS INGREDIENT, it is entirely free from objectionable action upon the bowels, and all the other drawbacks to the use of Ordinary Lozenges; while, instead of being nauseous, it is pleasant to the taste.

It is very SUSTAINING TO THE SYSTEM, preventing feelings of fatigue and faintness at times when food cannot be conveniently taken; and it GREATLY AIDS DIGESTION.

ST. MARY'S KIRKDALE, LIVERPOOL, 24th March, 1887.

'I have used Lozenges for many years with much advantage, but I never experienced so much and marked benefit as I did last Sunday from your Mitre Lozenges. I had a cold and my throat was doubtful, and I feared for my voice, but after taking two I could speak with ease, and my voice was clear and strong. I recommend a trial.'—

(*Hon: Canon of Liverpool*) **T. MAJOR LESTER.**

ALL CHEMISTS, 1s. 1½d. & 2s. 9d.

Manufactured for the Proprietors, J. & G. HAWKE, by

ALLEN & HANBURYS (Free for Thirteen Stamps.) {37, LOMBARD ST., LONDON

CITY OF LONDON DAY TRAINING COLLEGE.

WHITE STREET, MOORFIELDS, E.C.

(Two minutes' walk from Moorgate Street Station, 5 from Broad Street, Liverpool Street, and the Bank.)

CERTIFICATE, 1889,	January 12th.
SCHOLARSHIP, 1889,	,, 12th.
Science	,, 5th.
Art	,, 5th.
"D" Certificate, October, '89 Exam. ...	,, 12th.
Matriculation, London University... ...	,, 12th.
Intermediate B.A., London University...	,, 12th.
Final B.A., London University	,, 12th.
Oxford and Cambridge Univers. Local ...	,, 12th.
Languages	,, 12th.
Tonic Sol-fa, Elementary	,, 12th.
Do. School Teachers' Music Certificate ...	,, 12th.
Royal Academy of Music	,, 12th.
Royal College of Music	,, 12th.
Needlework, London Institute, Diploma	,, 12th.
PUPIL TEACHERS' CENTRAL CLASSES,	January 8th.

The above are the dates fixed for commencing the Classes named.
For Prospectus, &c., address PROFESSOR CUSACK, as above.
Personal applications may be made any day between 10 a.m. and 4 p.m.
Tuition by Correspondence for Students in the Country.

MADE WITH BOILING WATER.

EPPS'S

GRATEFUL—COMFORTING.

COCOA

MADE WITH BOILING MILK

'The best system of shorthand.'—*Daily News.*

PITMAN'S SHORTHAND.

Recommended by the 'Society of Arts.'

PITMAN'S SHORTHAND.

Taught in 1,000 Schools, Colleges, Institutes, &c.,

PITMAN'S SHORTHAND.

Including Rugby, King's College, Haileybury, &c.

PITMAN'S SHORTHAND.

'The Phonographic Teacher,' 6d. 1,270,000 sold.

Specimen free to Head Masters.

ISAAC PITMAN & SONS, AMEN CORNER, E.C.

DRAWING INSTRUMENTS FOR SCHOOL USE.

W. H. HARLING, 40, Hatton Garden, London, E.C.
Patentee of NEW CONE FITTING INSTRUMENTS.
FORTY YEARS PRACTICAL MANUFACTURER.
ILLUSTRATED CATALOGUES POST FREE.

Post 8vo. Strongly bound. Price 7s.

CAREY'S

'GRADUS AD PARNASSUM.'

With the English Meanings. Recently Revised, Corrected, and Augmented by a member of the University of Cambridge.

London: Published by the Stationers' Company, Stationers' Hall, Ludgate Hill.

***W. & A. K. JOHNSTON'S IMPERIAL SERIES** OF SCHOOL WALL MAPS. Ten Maps. 21s. each.

***W. & A. K. JOHNSTON'S SERIES OF LARGE** SCHOOL WALL MAPS. Thirty-two Maps. 12s. each.

***W. & A. K. JOHNSTON'S SERIES OF** CLASSICAL AND SCRIPTURAL LARGE SCHOOL WALL MAPS. Eleven Maps. 12s. each.

***W. & A. K. JOHNSTON'S SERIES OF PHY-**SICAL LARGE SCHOOL WALL MAPS. Six Maps. 12s. each.

***W. & A. K. JOHNSTON'S SERIES OF OUT-**LINE OR TEST LARGE SCHOOL WALL MAPS. Fifteen Maps. 12s. each.

***W. & A. K. JOHNSTON'S SERIES OF SMALL** SCHOOL WALL MAPS. Twenty-two Maps. 6s. each.

A Handbook is given gratis with each Map.

W. & A. K. JOHNSTON'S ILLUSTRATIONS OF NATURAL PHILOSOPHY. Thirty-nine Sheets. 12s. each (except Natural History. 15s. each).

A Handbook is given gratis with each Sheet.

W. & A. K. JOHNSTON'S HISTORY CHARTS. Four Charts. 12s. each.

W. & A. K. JOHNSTON'S NATURAL HIS-TORY PLATES AND TYPES OF NATIONS. Seventy-five plates. 3s. 6d. each, 36s. for a selection of One Dozen.

*** All the above Maps, Illustrations, and Charts, are mounted on Cloth and Rollers, varnished, in the best possible manner.

W. & A. K. JOHNSTON'S SCHOOL ATLASES of POLITICAL, CLASSICAL, PHYSICAL, HISTORICAL, and SCRIPTURAL GEOGRAPHY. Thirty-eight Atlases.

W. & A. K. JOHNSTON'S PENNY MAPS: POLITICAL, PROJECTION, OUTLINE, TEST, and CLASSICAL. 196 Maps.

W. & A. K. JOHNSTON'S SCHOOL GLOBES, TERRESTRIAL and CELESTIAL. Six sizes.

W. & A. K. JOHNSTON'S GEOGRAPHICAL HANDBOOKS. Entirely Re-Edited, and uniform in size, &c. 32 pp., Crown 8vo, price 3d. each. Twenty-eight Books.

Complete Catalogue free by post to any Address.

W. & A. K. JOHNSTON

(ESTABLISHED 1825),

GEOGRAPHERS TO THE QUEEN,

EDUCATIONAL AND GENERAL PUBLISHERS,

EDINA WORKS, EASTER ROAD, EDINBURGH,

AND

5, WHITE HART STREET, WARWICK LANE,

LONDON, E.C.

APPROVED

EDUCATIONAL WORKS.

By J. C. CURTIS, B.A.

Outlines of English History. Arranged in Chronological Order. **612,000 sold.** 6d.

'As an introduction to English History we know of none equal to it.'—*Quarterly Journal of Education.*

'For the elementary facts of English History there is no book so useful as Curtis's "Outlines."'—*Educational Times.*

'Decidedly the best and fullest summary of English History that we have seen.'—*Museum.*

BY THE SAME AUTHOR.

A School and College History of England. Containing Chapters on Religion, Government, Literature, Trade, Manners, and Customs, &c. **28,000 sold.** 5s. 6d.

Chronological and Genealogical Tables, illustrative of English History. **13,000 sold.** 2s.

A Short Manual of English History, with Genealogical Tables. **16,000 sold.** 6d.

Outlines of Scripture History. 45,000 sold. 6d.

An English Grammar for Schools, with copious Exercises, as well as Examples of Parsing and Analysis. **23,000 sold.** 1s.

Outlines of English Grammar, with copious Exercises. **250,000 sold.** 6d.

A Manual of Grammatical Analysis, with copious Exercises for Analysis and Composition. **90,000 sold.** 6d.

A Manual of English Etymology. 27,000 sold. 6d.

First Book of Grammar and Analysis, with Copious Exercises. **21,000 sold.** 3d.

Outlines of Geography. 211,000 sold. 6d.

The Geography of Great Britain and Ireland. 25,000 sold. 6d.

First Book of Geography. 11,000 sold. 6d.

The Junior Reader. Prose and Poetry. **5,000 sold.** 1s.

The Poetical Reader. 134,000 sold. Strongly bound. 1s.

The New Poetical Reader. 30,000 sold. 1s.

The Complete Poetical Reader. Being the Poetical Reader and the New Poetical Reader in One Volume. Extra gilt. 2s.

London: HAMILTON, ADAMS & CO.;

And all Booksellers in Town and Country.

CIVIL SERVICE EXAMINATIONS.

Men Clerks, Age 17—20; **Female Clerks, 18—20; Boy Clerks, 15—17; Excise Assistants, 19—22; Customs, 19—25; Telegraphists, Engineer Students,** &c. Rapid Postal preparation of country students on a thoroughly individual system by **J. KEEFE, F.R.G.S., Fellow** and **Examiner** to the **Society** of **Science** (London), &c.

LIVERPOOL.—22, Gt. George St. MANCHESTER.—2, Victoria St.

Over 330 Successes. Prospectus Free.

Tuition by Correspondence

ESTABLISHED 1871.

PUPILS may now be entered for Certificate (1st and 2nd years), Scholarship, Science and Art, Matriculation, A.C.P., and Musical Examinations.

Pupils for Certificate (2nd year men) may take the course for Mathematics only, if desired.

Scripture (for December and July), Languages, Special Subjects, Shorthand, Book-keeping, &c., from 10s. per quarter.

We draw attention to our Courses for Pupil Teachers, Army Schoolmasters and Mistresses, Civil Service Branches, Medical and Legal Preliminary, and to our new department 'Notes and Queries.'

Intending Students and Enquirers (for whatever subject or branch) should write at once to our Office, naming this paper.

Address, JAMES JENNINGS and Co, Tuition by Correspondence Office, Deptford, London.

MANCHESTER TRACTS ON EDUCATION.

By JAMES A. NEWBOLD, B.A., Manchester School Board.

TRACT III.—TECHNICAL EDUCATION:

A Two Fold Protest—Educational and Financial.

Heads of Chapters:—Ambiguity of Term—What Technical Instruction cannot do—A Technical Utopia, who shall pay?—Self-help v. Rate-aid—The Lesson of German Competition—Educational Philistinism—Professor Huxley on 'Pouring In'—The Work of the Science and Art Department—English v. Foreign Clerks.

MANCHESTER AND LONDON: **JOHN HEYWOOD. (SIXPENCE.)**

Messrs. Longmans & Co.'s Educational Works.

CLASSICS.

WORKS BY REV. B. H. KENNEDY, D.D.

The Revised Latin Primer. Fcap. 8vo ..... 2s. 6d.

The Shorter Latin Primer. Fcap. 8vo ..... 1s.

The Public School Latin Grammar. Crown 8vo ..... 7s. 6d.

The Child's Latin Primer; or, First Latin Lessons. 12mo ..... 2s.

The Child's Latin Accidence. Extracted from the 'Child's Latin Primer.' 12mo ... 1s.

An Elementary Grammar of the Latin LANGUAGE. 12mo ..... 3s. 6d.

Elementary Latin Reading-Book. 12mo ..... 2s.

Second Latin Reading Book; or, Palæstra Latina. Adapted to the 'Public School Latin Primer.' 12mo ..... 5s.

WORKS BY ARCHDEACON FARRAR.

A Brief Greek Syntax and Hints on GREEK ACCIDENCE. With some Reference to Comparative Philology, and with Illustrations from various Modern Languages. 12mo..... 4s. 6d.

Greek Grammar Rules, drawn up for the Use of Harrow School. 8vo ..... 1s. 6d.

A Greek-English Lexicon. Compiled by HENRY GEORGE LIDDELL, D.D., and ROBERT SCOTT, D.D. 4to..... 36s.

A Greek-English School Lexicon, abridged from the above. By HENRY GEORGE LIDDELL, D.D., and ROBERT SCOTT, D.D. Square 12mo ..... 7s. 6d.

A New Elementary Greek Grammar. Intended as a Companion to the 'Public School Latin Primer.' By the Rev. E. St. J. PARRY, M.A. 12mo ..... 3s. 6d.

Longmans' Greek Copy-Book. By A. G. GRENFELL, Assistant Master at Westminster School. Oblong 4to, sewed ..... 6d.

Gallus; or, Roman Scenes of the Time of Augustus. By Prof. BECKER. Translated from the German by the Rev. F. METCALFE. Post 8vo ..... 7s. 6d.

Charicles; or, Illustrations of the Private Life of the Ancient Greeks. By Prof. BECKER. Translated from the German by the Rev. F. METCALFE. Post 8vo ..... 7s. 6d.

The Poems of Virgil (the Bucolics, the Georgics, the Æneid) translated into English Prose. By JOHN CONINGTON, M.A., late Corpus Professor of Latin in the University of Oxford. Crown 8vo ..... 6s.

The Æneid of Virgil, translated into English Verse. By JOHN CONINGTON, M.A. Crown 8vo ..... 6s.

MATHEMATICS.

Longmans' School Arithmetic. By F. E. MARSHALL, M.A., late Foundation Scholar of Trinity College, Cambridge, and J. W. WELSFORD, M.A., late Fellow of Gonville and Caius College, Cambridge; Assistant Masters at Harrow School. Crown 8vo, with and without Answers ..... 3s. 6d.

Longmans' Junior School Arithmetic. An Arithmetic for Beginners, Mental and Practical. Fcap. 8vo, 1s.; with Answers, 1s. 6d.

WORKS BY BISHOP COLENSO.

Arithmetic, designed for the use of Schools; to which is added a Chapter on Decimal Coinage. Revised Edition, with Notes and Examination Papers. 12mo..... 4s. 6d.
KEY..... 5s.

Shilling Arithmetic for the use of Elementary Schools. 18mo, 1s.; or with Answers, 1s. 6d.

Elements of Algebra. Part I. 12mo, 4s. 6d.
KEY..... 5s.
——— PART II. 12mo ..... 6s.
KEY..... 5s.

Elements of Algebra, for the use of National and Adult Schools. 18mo..... 1s. 6d.
KEY..... 2s. 6d.

Plane Trigonometry. Part I. 12mo, 3s. 6d.
KEY..... 3s. 6d.
——— PART II. 12mo ..... 2s. 6d.
KEY..... 5s.

Plane and Spherical Trigonometry. In three Parts, comprising those portions of the subjects, theoretical and practical, which are required in the Final Examination for Rank of Lieutenant at Greenwich. By H. B. GOODWIN, M.A. Published under the sanction of the Admiralty. 8vo..... 8s. 6d.

MECHANICS.

WORKS BY T. M. GOODEVE, M.A.

Principles of Mechanics. New Edition, Re-written and Enlarged. With 253 Woodcuts, and numerous Examples. Crown 8vo..... 6s.

The Elements of Mechanism. New Edition, Re-written and Enlarged. With 342 Woodcuts. Crown 8vo..... 6s.

A Manual of Mechanics. An Elementary Text-Book for Students of Applied Mechanics. With 138 Illustrations and Diagrams, and 188 Examples taken from the Science Department Examination Papers, with Answers. Fcap. 8vo ..... 2s. 6d.

Lessons in Elementary Mechanics. Designed for the use of Schools and of Candidates for the London Matriculation, and other Examinations. With 52 Examples and nearly 500 Exercises and Examination Questions with Answers, and 124 Woodcuts. By Sir PHILIP MAGNUS, B.Sc., B.A. Thirteenth Edition. Fcap. 8vo ..... 3s. 6d.

HISTORY.

MACAULAY'S WORKS.

POPULAR EDITION. FOUR VOLUMES.
Price 2s. 6d. each Volume.

History of England. 2 vols. Crown 8vo... 5s.

Essays and Lays of Ancient Rome, &c. 1 vol. Crown 8vo..... 2s. 6d.

Miscellaneous Writings and Speeches. 1 vol. Crown 8vo..... 2s. 6d.

*** These Editions will be ready on Jan. 15.

A Class-Book History of England. Designed for the use of Students preparing for the University Local Examinations or for the London University Matriculation, and for the Higher Classes of Elementary Schools. By the Rev. D. MORRIS, B.A. Forty-seventh to fifty-sixth Thousand. With Maps and Woodcuts. Fcap. 8vo ..... 3s. 6d.

MODERN LANGUAGES.

WORKS BY LÉON CONTANSEAU.

A Practical Dictionary of the French and ENGLISH LANGUAGES. New and much Cheaper Edition. Post 8vo. .....3s. 6d.

A Pocket Dictionary of the French and ENGLISH LANGUAGES; being a careful Abridgement of the Author's 'Practical French and English Dictionary,' preserving all the most useful features of the original, condensed in a much smaller volume. New and much Cheaper Edition. Square 18mo .....1s. 6d.

Premières Lectures: a Selection of Instructive and Entertaining Stories from the best French Authors who have written for the Young, with English Notes, followed by a few Easy Poetical Pieces suitable to be learnt by heart. 12mo..... 2s. 6d.

First Step in French: an Easy Method of Learning the Elements of the Language. 12mo ..... 2s. 6d.

Modern French Grammar: comprising Vocabularies, Conversational Lessons, and copious Exercises composed from the best French Authors of the Present Day. 12mo ..... 4s.
KEY ..... 3s.

Elementary French Course, adapted for Middle-Class Schools. 18mo.

1. Accidence .....8d.
2. Syntax .....8d.
3. Conversation-Book .....8d.
4. First Exercise-Book .....8d.
5. Second Exercise-Book .....8d.
6. Translation-Book 8d.
7. Easy French Delectus .....8d.
8. First French Reader .....8d.
9. Second French Reader .....8d.
10. French and English Dialogues 8d.

The Graduated Course of Translation from ENGLISH into FRENCH. Edited by Professors CH. CASSAL, LL.D., and TH. KARCHER, LL.B. Small 8vo, in Two Volumes or Parts ..... 8s. 6d.
Or separately, PART I., Junior Course 3s. 6d.
PART II., Senior Course ..... 5s.
The KEY to Part I., for Teachers only ..... 5s.

French Commercial Correspondence. With Exercises, French-English and English-French Glossaries, Hints on Letter-Writing, and Copious Notes. By ELPHEGE JANAU, Assistant French Master, Christ's Hospital. Crown 8vo..... 2s. 6d.

German Commercial Correspondence. With Exercises, German-English and English-German Glossaries, Hints on Letter-Writing, German Idioms, and Copious Notes. By JOSEPH T. DANN, Ph.D. Crown 8vo 2s. 6d.

Petit Théâtre des Enfants. Twelve Tiny French Plays for Children. By Mrs. HUGH BELL. Fcap. 8vo ..... 1s. 6d.

GEOGRAPHY AND ATLASES.

Longmans' School Geography. By GEORGE G. CHISHOLM, M.A., B.Sc., F.R.G.S., &c. With 61 Illustrations and Diagrams. Crown 8vo ..... 3s. 6d.
QUESTIONS to the above ..... 1s.

The Public Schools Atlas of Modern GEOGRAPHY, in 33 Coloured Maps. Edited, with an Introduction on the Study of Geography, by the Rev. G. BUTLER, D.D., Canon of Winchester, and formerly Principal of Liverpool College. The Maps by E. WELLER, F.R.G.S. Imperial 8vo, or Imperial 4to ..... 5s.

The Public Schools Atlas of Ancient GEOGRAPHY, in 28 entirely New Coloured Maps, Drawn and Engraved by E. WELLER, F.R.G.S. Edited, with an Introduction on the Study of Ancient Geography, by the Rev. G. BUTLER, D.D. Imperial 8vo or imperial 4to ..... 7s. 6d.

JOSEPH HUGHES'S
LIST OF
NEW & FORTHCOMING WORKS.

NOW READY. Crown 8vo, extra cloth gilt. Specially interleaved with Students' Note Paper. *Price 2s. 6d.*

THE ELEMENTS OF MENTAL AND MORAL SCIENCE AS APPLIED TO TEACHING.

Exactly adapted to the School Management Section of the Certificate Examination.

By **Professor Coupland, M.A., D.Sc.**, Author of 'The Spirit of Goethe's Faust;' Translator of Hartmann's 'Philosophie des Unbewussten.'

NOW READY. Third Edition. Price 2s. 6d.

PRACTICAL ORGANIC CHEMISTRY.

By **Professor Chapman Jones, F.I.C., F.C.S.**, Demonstrator of Practical Chemistry at the Normal School of Science, and Royal School of Mines.

Almost entirely re-written, greatly enlarged, and brought up to the very latest requirements of the Science and Art Department and the London B.Sc.

The Civilian says—'To science teachers and candidates preparing for the Indian Civil Service, this book will be found extremely useful.'

The Educational News says—'A valuable handbook for preparing for Examination.'

The School Guardian says—'Will assist the student very materially in acquiring a sound practical knowledge of Organic Chemistry.'

NOW READY. Crown 8vo, extra cloth. Price 2s. 6d.

HOW TO TEACH THE BABIES.

By **James Bailey**, Head Master of Southlands Training College. A Manual of Infant School Method.

NOW READY. Price 1s.

THE PRINCIPLES & PRACTICE OF MENTAL ARITHMETIC.

With numerous Graduated Exercises. By the **Rev. A. D. Capel, M.A.**, Author of 'Catch Questions in Arithmetic and Mensuration,' &c., &c.

A Text-Book for Pupil Teachers, Students in Training, and Acting Teachers.

VARIED OCCUPATIONS FOR INFANTS,

WITH NOTES OF LESSONS. By **Mrs. Mortimer**, Lecturer at the Home and Colonial Training College. *(In the Press.)*

London: JOSEPH HUGHES, Pilgrim Street, Ludgate Hill, E.C.

MR. MURRAY'S LIST OF EDUCATIONAL WORKS.

HISTORY, LANGUAGE, GEOGRAPHY, SCIENCE, &c.

ENGLAND.—HISTORY.

The Student's Hume; A History of England from the Earliest Times to 1688. Continued to 1878. *Thoroughly Revised.* By the late Prof. J. S. BREWER. With Coloured Maps and Woodcuts (830 pp.) 160th thousand. 7s. 6d. Or in Three Parts, 2s. 6d. each. I.—B.C. 55–A.D. 1485. II.—A.D. 1485–1688. III.—1688–1878.

Dr. Smith's Smaller History of England, down to 1878. Coloured Maps and 68 Woodcuts. (400 pp.) 3s. 6d.

Primary History of Britain for Junior Classes. *A New and thoroughly Revised Edition.* With Coloured Map. (430 pp.) 2s. 6d.

Mrs. Markham's History of England, down to 1880. 100 Woodcuts. (528 pp.) 3s. 6d.

Little Arthur's History of England, down to 1878. 36 Woodcuts. 490th thousand. (287 pp.) 1s. 6d.

Students' Constitutional History of England. Henry VII.—George II. By HENRY HALLAM. (680 pp.) 7s. 6d.

Students' English Church History. 3 Vols. 7s. 6d. each. I. 596–1509. II. 1509–1717. III. 1717–1884. By CANON PERRY.

Students' English Language. Its Origin and Growth. By GEO. MARSH. (538 pp.) 7s. 6d.

Students' English Literature. With Biographies. By T. B. SHAW. (510 pp.) 7s. 6d.

Students' Specimens of English Literature. By T. B. SHAW. (560 pp.) 7s. 6d.

Smaller Manual of English Literature. With Lives of our Chief Writers. (276 pp.) 3s. 6d.

Smaller Specimens of English Literature. (368 pp.) 3s. 6d.

DR. WM. SMITH'S ENGLISH COURSE.

***English Grammar.** With Exercises. (270 pp.) 3s. 6d.

***Primary English Grammar.** With Exercises and Questions. (120 pp.) 1s.

Modern Geography. (400 pp.) 5s.

Smaller Modern Geog. (290 pp.) 2s. 6d.

English Composition. With Illustrations and Exercises. (210 pp.) 3s. 6d.

A Readable English Dictionary. Etymologically arranged. By DAVID MILNE, M.A. Crown 8vo. *just out.* 7s. 6d.

FRANCE.—HISTORY.

Students' History of France, to 1873. Coloured Maps and Woodcuts. 7s. 6d.

*** See also Students' History of Modern Europe below.

Mrs. Markham's History of France, down to 1878. 70 Woodcuts. (550 pp.) 3s. 6d.

Little Arthur's History of France, to the Fall of the Second Empire. Maps and Woodcuts. (305 pp.) 2s. 6d.

DR. WM. SMITH'S FRENCH COURSE.

FRENCH PRINCIPIA.

***Part I.** Grammar, Exercises, Vocabularies, Materials for Conversation, &c. (209 pp.) 3s. 6d.

***Appendix to Part I.** Additional Exercises and Examination Papers. (110 pp.) 2s. 6d.

***Part II.** A French Reading Book; with Etymological Dictionary. (376 pp.) 4s. 6d.

***Part III.** Prose Composition. (386 pp.) 4s. 6d.

Students' French Grammar. With an Introduction by M. LITTRÉ. (490 pp.) 6s.

Smaller French Gram. (230 pp.) 3s. 6d.

GERMANY—HISTORY

Students' Modern Europe. From the Fall of Constantinople to the Treaty of Berlin. By R. LODGE, M.A. (800 pp.) 7s. 6d.

Students' History of Europe during the Middle Ages. By HENRY HALLAM. (650 pp.) 7s. 6d.

Mrs. Markham's History of Germany, to 1880. 50 Woodcuts. (460 pp.) 3s. 6d.

DR. WM. SMITH'S GERMAN COURSE

GERMAN PRINCIPIA.

***Part I.** Grammar, Exercises, Vocabularies, Materials for Conversation, &c. (244 pp.) 3s. 6d.

***Part II.** A German Reading Book; with a Dictionary. (272 pp.) 3s. 6d.

Practical German Grammar. For Advanced Students. (240 pp.) 3s. 6d.

DR. WM. SMITH'S ITALIAN COURSE.

ITALIAN PRINCIPIA.

***Part I.** Grammar, Delectus, Exercises, and Vocabularies. (288 pp.) 3s. 6d.

***Part II.** An Italian Reading Book. (222 pp.) 3s. 6d.

*** See also Students' History of Modern Europe, above.

ROME.—HISTORY.

Students' History of Rome, to the Establishment of the Empire. By DEAN LIDDELL. Coloured Map and Woodcuts. (686 pp.) 7s. 6d.

Students' Gibbon: The Decline and Fall of the Roman Empire. 100 Woodcuts. (700 pp.) 7s. 6d.

Smaller History of Rome, to the Establishment of the Empire. Coloured Map and 70 Illustrations. (324 pp.) 3s. 6d.

DR. WM. SMITH'S LATIN COURSE.

PRINCIPIA LATINA.

Young Beginners' First Latin Book: an Introduction to Principia Latina, Part I. (112 pp.) 2s.

Young Beginners' Second Latin Book: an Introduction to Principia Latina, Part II. (98 pp.) 2s.

***Part I.** Containing Grammar, Delectus, Exercises, and Vocabularies. (216 pp.) 3s. 6d.

***Appendix to Part I.** Additional Exercises and Examination Papers. (125 pp.) 2s. 6d.

***Part II.** A First Latin Reading Book. (268 pp.) 3s. 6d.

***Part III.** A First Latin Verse Book. (160 pp.) 3s. 6d.

***Part IV.** Latin Prose Composition. (194 pp.) 3s. 6d.

***Part V.** Short Tales and Anecdotes for Translation into Prose. (102 pp.) 3s.

A Child's First Latin Book. Comprising a full Practice of Nouns, Pronouns, and Adjectives, with the Verbs. By T. D. HALL. New Edition. (138 pp.) 2s.

Students' Latin Grammar. For the Higher Forms. (450 pp.) 6s.

Smaller Latin Grammar. For Middle and Lower Forms. (360 pp.) 3s. 6d.

Latin-English Vocabulary to Phædrus, Cornelius Nepos, and Cæsar's Gallic War. (190 pp.) 3s. 6d.

Tacitus, Germania, Agricola, and First Book of the Annals. With Notes. (376 pp.) 3s. 6d.

Oxenham's Latin Elegiacs. With Rules of Composition. (156 pp.) 3s. 6d.

ETON COLLEGE LATIN SERIES.

The Eton Latin Grammar. *An entirely new work, just out.* By F. H. RAWLINS, M.A., and W. R. INGE, M.A. Crown 8vo. 6s.

The Eton Elementary Latin Grammar. By A. C. AINGER, M.A., and H. G. WINTLE, M.A. (327 pp.) 3s. 6d.

The Preparatory Eton Grammar. *Abridged from the above work.* (108 pp.) 2s.

***A First Latin Exercise Book.** Adapted to the above Grammar. (152 pp.) 2s. 6d.

The Eton Fourth Form Ovid. Selections from Ovid and Tibullus. With Notes by H. G. WINTLE. (155 pp.) 2s. 6d.

The Eton Horace. The Odes, Epodes, and Carmen Sæculare. With Notes by F. W. CORNISH. Maps. (380 pp.) 6s.

LATIN DICTIONARIES.

A Smaller Latin-English Dictionary. With Proper Names. *A New and thoroughly Revised Edition.* By Dr. WM. SMITH, and Prof. T. D. HALL, M.A. (733 pp.) 7s. 6d. The Etymological portion by Dr. INGRAM.

A Smaller English-Latin Dictionary. (730 pp.) 7s. 6d.

A Complete Latin-English Dictionary. With Tables of the Calendar, Measures, Weights, and Moneys, Proper Names, &c. (1900 pp.) Cheaper Edition, 16s.

A Copious and Critical English-Latin Dictionary. From original sources. (970 pp.) Cheaper Edition, 16s.

ANCIENT HISTORY AND MYTHOLOGY.

Students' Ancient History. To the Conquests of Alexander the Great. By PHILIP SMITH. With Woodcuts. (608 pp.) 7s. 6d.

Smaller Ancient History. To the Conquests of Alexander the Great. 70 Illustrations. (310 pp.) 3s. 6d.

Classical Mythology. For Ladies' Schools and Young persons. 90 Woodcuts. (300 pp.) 3s. 6d.

GREECE.—HISTORY.

Students' History of Greece. Coloured Maps and Woodcuts. (640 pp.) 7s. 6d.

Smaller History of Greece. To the Roman Conquest. Coloured Maps and 74 Illustrations. (268 pp.) 3s. 6d.

DR. WM. SMITH'S GREEK COURSE.

INITIA GRÆCA.

***Part I.** Grammar, Delectus, Exercises and Vocabularies. (284 pp.) 3s. 6d.

***Appendix to Part I.** Additional Exercises and Examination Papers. (110 pp.) 2s. 6d.

***Part II.** A Greek Reading Book. (220 pp.) 3s. 6d.

***Part III.** Prose Composition. (202 pp.) 3s. 6d.

Students' Greek Grammar. For the Higher Forms. (386 pp.) 6s.

Smaller Greek Grammar. For Middle and Lower Forms. (220 pp.) 3s. 6d.

Greek Accidence. (125 pp.) 2s. 6d.

Plato. Selections. With Notes. (242 pp.) 3s. 6d.

Hutton's Principia Græca. Comprehending Grammar, Delectus, Exercise Book, with Vocabularies, &c. (154 pp.) 3s. 6d.

BIBLE & CHURCH HISTORY.

Concise Dictionary of the Bible; ITS ANTIQUITIES, BIOGRAPHY, GEOGRAPHY, NATURAL HIST., &c. Illustrations. (1039 pp.) 21s.

Smaller Bible Dictionary. Illustrations. (620 pp.) 7s. 6d.

Students' Old Testament History. By PHILIP SMITH. Maps and Woodcuts. (630 pp.) 7s. 6d.

Students' New Testament History. By PHILIP SMITH. With Maps and Woodcuts. (680 pp.) 7s. 6d.

Dr. Smith's Smaller Scripture History. Continued down to A.D. 70. 40 Illustrations. (370 pp.) 3s. 6d.

Students' Moral Philosophy. By Dr. FLEMING. (440 pp.) 7s. 6d.

Students' Ecclesiastical History. 2 Vols. 7s. 6d. each. I. A.D. 30—1003. II. 1003—1614. By PHILIP SMITH. Woodcuts.

A Short Practical Hebrew Grammar, With Analysis and Vocabulary. By Prof. STANLEY LEATHES. (252 pp.) 7s. 6d.

SCIENCE AND GEOGRAPHY.

Newth's First Book of Natural Philosophy. (200 pp.) 3s. 6d.

Lyell's Students' Elements of Geology. Revised by Prof. P. MARTIN DUNCAN. 600 Illustrations. (641 pp.) 9s.

***Eton Exercises in Algebra.** By E. P. ROUSE and A. COCKSHOTT. (124 pp.) 3s.

***Eton Exercises in Arithmetic.** By the Rev. T. DALTON, M.A. (134 pp.) 3s.

Students' Ancient Geography. By CANON BEVAN. Woodcuts. (710 pp.) 7s. 6d.

Students' Modern Geography. By CANON BEVAN. Woodcuts. (684 pp.) 7s. 6d.

Students' Geography of British India. By Dr. GEORGE SMITH. Maps. (382 pp.) 7s. 6d.

Dr. Wm. Smith's Smaller Ancient Geography. 30 Illustrations. (240 pp.) 3s. 6d.

Dr. Wm. Smith's Smaller Modern Geography. Physical and Political. (290 pp.) 2s. 6d.

CLASSICAL DICTIONARIES.

Classical Dictionary of Greek and Roman Mythology, Biography, and Geography. 750 Woodcuts. 8vo. 18s.

Smaller Classical Dictionary. With 200 Woodcuts. 7s. 6d.

Smaller Dictionary of Greek and Roman Antiquities. 200 Woodcuts. 7s. 6d.

* Keys to these Works may be obtained by authenticated teachers on application to the publisher.

Mr. Murray's Illustrated Catalogue, containing full particulars of the above Works, as well as of many other books suitable for Scholars, Students, and School Prizes, sent by post on application.

JOHN MURRAY, ALBEMARLE STREET.

GEORGE GILL & SONS'
RECENT PUBLICATIONS.

All Teachers should see the following before ordering new books.

THE 'WHITEHALL' LITERARY READERS.

The only Standard Readers specially compiled to suit the latest requirements of the Code. They are not old reading books re-dressed, but are entirely new.

STANDARD I. ... ... 9d. | STANDARD III. ... ... 1s. 0d.
STANDARD II. ... ... 10d. | STANDARD IV. ... ... 1s. 3d.
STANDARD V. (Voyages and Travels; comprising scenes from the history of Exploration.) The most interesting reader published ... 1s. 4d.
STANDARDS VI. & VII. (Extracts from the Works of Standard Authors.) ... ... 1s. 6d.

Also Primers Part 1, 2, and 3; each 3d. Cloth.

THE 'ALBERT' GEOGRAPHICAL READERS.

The most interesting, the most readable, and the most beautiful Geographical Readers yet produced.

STANDARD I. ... ... 9d. | STANDARD IV. ... ... 1s. 0d.
STANDARD II. ... ... 9d. | STANDARD V. ... ... 1s. 4d.
STANDARD III. ... ... 1s. 0d. | STANDARD VI. ... ... 1s. 6d.
STANDARD VII. ... ... 1s. 6d.

THE 'WHITEHALL' DRAWING COPY BOOKS

Specially prepared in accordance with the New Schedule. The following numbers are now ready:—

FREEHAND DRAWING.

STANDARDS I. & II.... No. 1. ... 2d.
STANDARD III. ... ... No. 2. ... 2d.
STANDARD IV. ... ... No. 3. ... 2d.
STANDARD V. ... ... No. 6. ... 2d.
STANDARD VI. ... ... No. 9. ... 2d.

MODEL DRAWING.

STANDARD IV. ... ... No. 4.... 2d.
STANDARD V. ... ... No. 7.... 2d.
STANDARD VI. ... ... No. 10.... 2d.

GEOMETRY.

STANDARD IV. ... ... No. 5.... 2d.
STANDARD V. ... ... No. 8.... 2d.
STANDARD VI. ...Nos. 11 & 12.... 2d.
STANDARD VII. ...Nos. 14 & 15.... 2d.

GILL'S PRACTICAL GEOMETRY FOR THE STANDARDS.

These little Text Books contain all that is necessary for this subject. Standard IV.; VI., Plane; VI., Solid; VII., Plane; VII., Solid. 2d. each. Standard V., 1d.

EVERY TEACHER SHOULD SEE

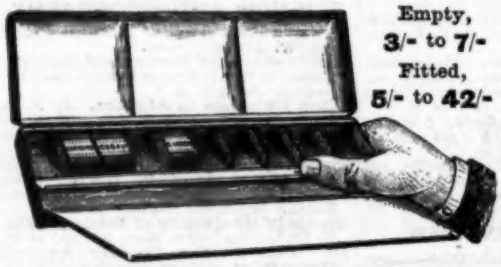
GILL'S 'VICTORIA JUBILEE' COPY BOOKS.

NOS. 1 TO 14 NOW READY. *TWOPENCE EACH.*

Beautifully printed, in coloured wrapper, on excellent paper, and the only twopenny Copy Book ever issued with 32 pages. Nos. 1 and 2 are for Infants. Samples Free.

GEORGE GILL & SONS, MINERVA HOUSE, WARWICK LANE, E.C.

EYRE & SPOTTISWOODE'S
DRAWING INSTRUMENTS,
WATER COLOURS, OIL COLOURS,
And all Drawing Materials suitable for TECHNICAL and ART STUDENTS.



Empty, 3/- to 7/-
Fitted, 5/- to 42/-

JAPANNED TIN BOXES OF MOIST WATER COLOURS.

LEVER BAR ACTION AND DIVISIONS FOR EACH COLOUR.

N.B.—By means of the Patent Lever Bar spring action, any pan or half-pan of colour can be instantaneously taken out and replaced at will.

LIBERAL TERMS FOR SCHOOLS. | ILLUSTRATED CATALOGUE sent Post Free on application to | LIBERAL TERMS FOR QUANTITIES.

EYRE & SPOTTISWOODE,
LONDON—Great New St., Fleet St., E.C.

SECOND YEAR CERTIFICATE—DECEMBER.

Highly successful Coaching by Correspondence. No fee unless successful first time. Backward students made to pass. Exceptionally low terms. Addressed envelope for particulars, list of successes, &c.,

GEORGE HENRY SPARROW, Forest Gate, London, E.

N.B.—Acting Teachers who intend taking Papers of the Second Year are invited to communicate at an early date with Mr. SPARROW. The work for Second Year Students having been the speciality for the past seven years, with increasing success each year, there is little fear of failure now. Dull Students are got through safely, and bright ones pushed into First Division.

46th YEAR OF PUBLICATION.

REDUCED FAC-SIMILE OF COVER.

NOW READY

AN ENTIRELY NEW EDITION OF

WIGHTMAN'S ARITHMETICAL TABLE BOOK.

ENLARGED to Crown 16mo., and INCREASED from 32 to 40 pages.

Many Million Copies of this valuable little work have been sold.

MAY BE HAD OF

SIMPKIN, MARSHALL & Co.; KENT & Co.; HAMILTON, ADAMS & Co., of the principal Scholastic Agencies,

AND OF THE PUBLISHERS,

WIGHTMAN & Co., 104 & 106, Regency Street, WESTMINSTER, LONDON.

BRITISH MUSEUM 1 JA 89